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State of Rhode Island and Providence Plantations.

# TWENTY-SIXTH ANNUAL REPORT

OF THE

# State Board of Agriculture

COMPLIMENTS OF

JOHN J. DUNN,

SECRETARY.

PROVIDENCE, R. I.
E. L. FREEMAN COMPANY, STATE PRINTERS.
1911.

State of Rhode Island and Providence Plantations.

# TWENTY-SIXTH ANNUAL REPORT

OF THE

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MADE TO THE

GENERAL ASSEMBLY

AT ITS

JANUARY SESSION, 1911.

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E. L. FREEMAN COMPANY, STATE PRINTERS.
1911.

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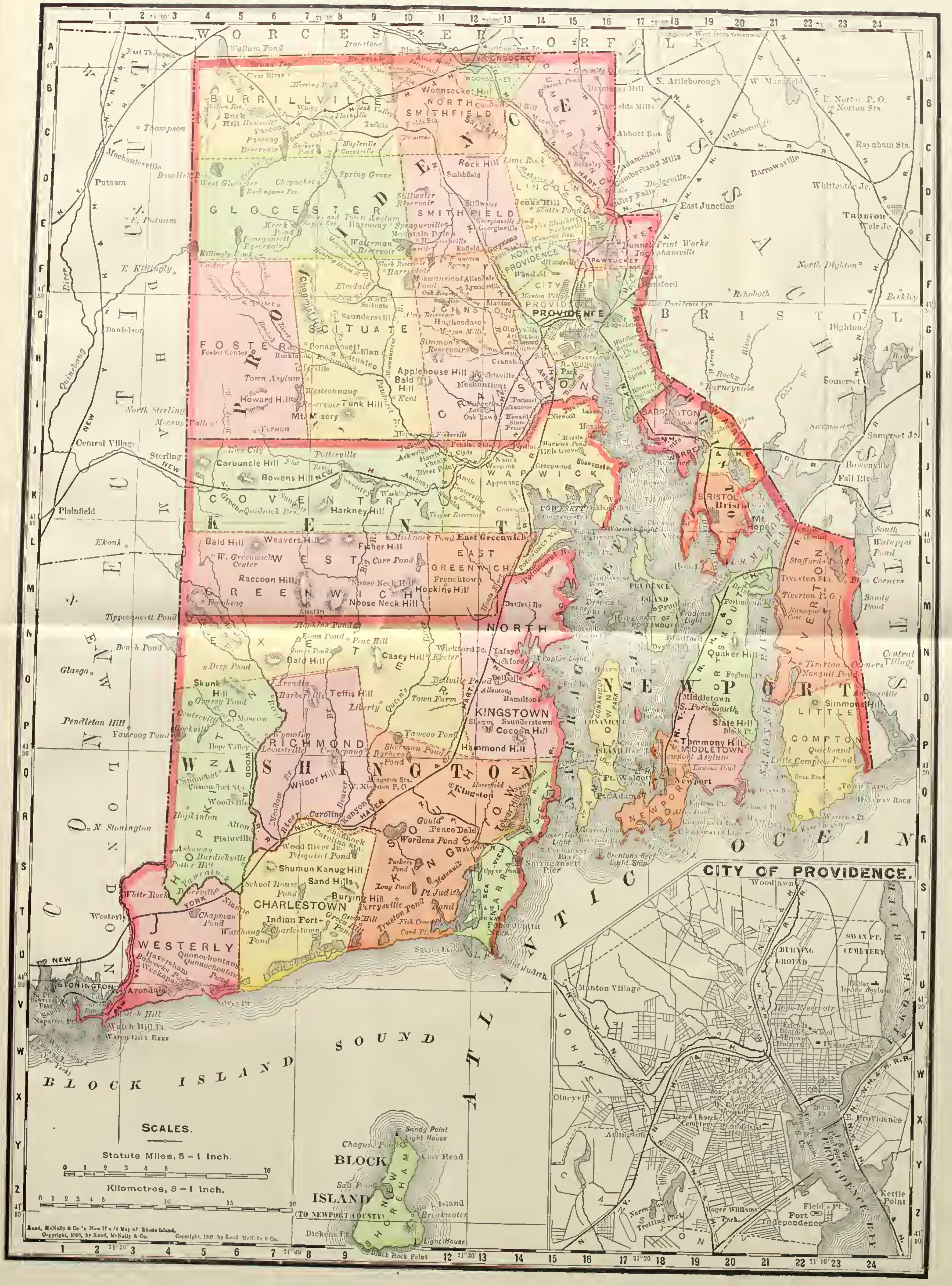WORCESTER
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PROVIDENCE
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WOONSOCKET
EAST PROVIDENCE
FOSTER
SCITUATE
CRANSTON
BARRINGTON
WARREN
BRISTOL
COVENTRY
WARWICK
WEST GREENWICH
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EXETER
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RICHMOND
HOPKINTON
CHARLESTOWN
WESTERLY
SOUTH KINGSTOWN
NARRAGANSETT
JAMESTOWN
PORTSMOUTH
MIDDLETOWN
NEWPORT
TIVERTON
LITTLE COMPTON
PRUDENCE ISLAND
CONANICUT ISLAND
BLOCK ISLAND
(TO NEWPORT COUNTY)
NEW SHOREHAM
NARRAGANSETT BAY
MT. HOPE BAY
SAKONNET RIVER
ATLANTIC OCEAN
BLOCK ISLAND SOUND
Sandy Point Light House
Clay Head
Chagum Pond
Salt Pond
Old Harbor Breakwater
Dickens Pt.
Light House
Black Rock Point
Watch Hill
Watch Hill Pt.
Point Judith
Brentons Reef Light Ship
Beaver Tail Light
Stonington
Westerly
Thompson
Putnam
Danielson
Plainfield
Central Village
Sterling
N. Stonington
N. Attleborough
Attleborough
Taunton
Somerset
Fall River
Dighton
Rehoboth
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Wickford
Bristol
Newport
Hope Valley
Wakefield
Peace Dale
Narragansett Pier
Tiverton
CITY OF PROVIDENCE.
Woodlawn
Manton Village
Olneyville
Arlington
Roger Williams Park
Narragansett Trotting Park
Hope Reservoir
Swan Pt. Cemetery
Butler Insane Asylum
Friends Boarding School
Brown University
Depot
Grace Church Cemetery
Rhode Island Hospital
E. Providence
India Pt.
Fields Pt.
Fort Independence
Kettle Point
PROVIDENCE RIVER
SEEKONK RIVER
SCALES.
Statute Miles, 5 – 1 Inch.
0 1 2 3 4 5 10
Kilometres, 8 – 1 Inch.
0 1 2 3 4 5 10 15 20
Rand, McNally & Co.'s New 11 x 14 Map of Rhode Island.
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# REPORT.

*To the Honorable the General Assembly of the State of Rhode Island:*

In compliance with Section 7 of Chapter 120 of the General Laws, I have the honor to submit herewith the twenty-sixth annual report of the State Board of Agriculture. Said report being for the year 1910.

JOHN J. DUNN,
*Secretary.*

# MEMBERS OF THE STATE BOARD OF AGRICULTURE.

*Ex-officio.*

Aram J. Pothier, Governor.

Zenas W. Bliss, Lieutenant-Governor.

J. Fred Parker, Secretary of State.

(Appointed by the Governor pursuant to Chapter 120 of the General Laws.)

| | |
|---|---|
| William E. Nichols, of Lincoln | Term expires Jan. 1913. |
| William Williams, of Bristol | " " " 1913. |
| C. C. Wordell, of Little Compton | " " " 1912. |

### APPOINTED BY AGRICULTURAL SOCIETIES.

*By the Washington County Agricultural Society.*

Philip A. Money, of Exeter.....................Term expires March, 1912.

*By the Rhode Island College of Agriculture and Mechanic Arts.*

Thomas G. Mathewson, of East Greenwich.....Term expires February, 1912.

*By the Rhode Island State Grange.*

I. L. Sherman, of Middletown...............Term expires December, 1912.

*By the Newport County Agricultural Society.*

E. R. Anthony, of Portsmouth..................Term expires March, 1912.

### SECRETARY OF THE BOARD.

John J. Dunn, of Westerly.

### *Executive Committee.*

William Williams, of Bristol.
I. L. Sherman, of Middletown.
Thomas G. Mathewson, of East Greenwich.

## CATTLE COMMISSIONERS.

| | |
|---|---|
| William Williams, of Bristol | for Bristol County. |
| Job Manchester, of Coventry | for Kent County. |
| William K. Boyd, of Portsmouth | for Newport County. |
| George T. Howard, of Little Compton | for Newport County. |
| Frank S. Cole, of Providence | for Providence County. |
| Tristam D. Babcock, of Westerly | for Washington County. |
| Philip A. Money, of Exeter | for Washington County. |

## VETERINARIAN.

John S. Pollard, D. V. S., of Providence.

Office and Library, State House, Room 129.

## LEGISLATIVE COMMITTEES ON AGRICULTURE, APPOINTED AT JANUARY SESSION, 1911.

| | |
|---|---|
| *Of the Senate* | Joseph E. Smith,<br>John W. Collins,<br>Eben Slocum,<br>Stanton A. Winsor,<br>Robert H. Wade. |
| *Of the House* | George Robinson,<br>Orrin Arnold,<br>Alvin C. Cash,<br>Edgar A. Mowry,<br>Moses F. Whipple,<br>Elmer Hopkins,<br>Timothy S. Quinn. |

# REPORT OF THE SECRETARY.

*To the Honorable the General Assembly of the State of Rhode Island:*

We submit herewith the twenty-sixth annual report of the State Board of Agriculture, the same being for the year 1910.

During the year there were held three meetings of the State Board of Agriculture and fourteen meetings of the Executive Committee.

At a meeting of the Board holden on the 14th day of June, 1910, the following officers were elected: Executive Committee, William Williams, of Bristol, Isaac L. Sherman, of Middletown, and Thomas G. Mathewson, of East Greenwich; Secretary, John J. Dunn, of Westerly; Nursery Inspector, Gypsy and Brown-tail Moth Superintendent; Officer in charge of the Elm Tree Beetle and Tussock work, the San Jose Scale work and Inspector of Apiaries, A. E. Stene, of South Kingstown; Veterinarian, John S. Pollard; Cattle Commissioners as follows: for Providence county, Francis S. Cole, of Providence; for Kent county, Job Manchester, of Coventry; for Newport county, William K. Boyd, of Portsmouth, and George T. Howard, of Little Compton; for Bristol county, William Williams, of Bristol; for Washington county, Philip A. Money, of Exeter, and Tristam D. Babcock, of Westerly; to release cattle at Brighton, Philip A. Money, of Exeter.

The year, generally speaking, and from information received from farmers in various parts of the State, has been a successful one for the farmers, the crops being considerably in excess of the crops of the previous year, and better than that of several years past. Because of the lack of funds with which to do the work we are unable to furnish a statistical table showing the yield per acre of the principal farm crops, and the farm value and retail price of such crops.

The potato yield was considerable larger than last year. The estimated total yield of potatoes in bushels, according to the last Agricultural Census of the State, taken in 1905, was 615,893, and the total for the year 1910 is 816,000 bushels, an average yield of 136 bushels per acre. The average farm value of potatoes was 69 cents per bushel on December 1, 1910, and the total value of the potatoes grown in the State during the year is $563,040.00. There was a considerable increase in the yield of corn, the yield for the year being 480,000 bushels, as compared with 365,000 in 1909, with a farm value, on December 1, 1910, of eighty-three cents per bushel, or $365,000.00 for the entire yield of corn.

Seventy-four thousand tons of hay was cut during the year as against sixty-eight thousand tons in the preceding year. The average farm value of hay, on December 1, 1910, was $19.60 per ton, or $1,450,400.00 for the entire harvest. Sixty-eight thousand bushels of oats were grown in 1910, as against 50,000 bushels in 1909. The farm value of oats, on December 1, 1910, is given as forty-eight cents, or $32,640.00.

The last census of the State shows that there were produced on the farms of the State, in 1905, 12,157,052 gallons of milk. At that time there were 23,619 milch cows, an average production per day of 5.6 quarts per cow. At the present time the United States Department of Agriculture, through the field agents employed, estimates that there are 26,000 milch cows in the State. Taking the average daily production of 5.6 quarts per day, it is estimated that 13,536,000 gallons of milk were produced in Rhode Island during the year 1910. The estimated farm value of milk is four cents per quart or $2,165,760.00 for milk produced.

During the year there has been a healthy development of the interest in fruit growing in the State. There has been a decided awakening among our farmers and fruit growers in regard to the possibilities of orcharding, and inquiries have come in to us in much larger numbers than ever before.

The New England Fruit Show opened the eyes of both the producer and consumer to the fact that we can grow fruit which will compare favorably with the high priced products of the western orchards, so far as appearance is concerned, and it will generally excel in quality.

The demonstrations carried on by the Board of Agriculture have convinced fruit growers that the San Jose Scale can be effectively controlled. This has given a tremendous encouragement to the fruit growers, since they now feel that if this pest can be successfully suppressed, it is quite possible to control the pests of lesser importance, such as the coddling moth and tent caterpillars; as well as some of the fungous diseases. It has also been demonstrated that the gypsy and brown-tail moths can be kept in suppression, and that our orchardists need fear nothing from these so long as an intelligent campaign against them can be continued.

The markets are also waking up to the worth of Eastern apples. The prices this fall demonstrate that, if put up well, they will bring as good prices as the Western-grown fruit. In fact, a report has recently come from Liverpool that Hudson river apples brought a higher price than Hood river apples in that market. Quality is beginning to assert itself, and our growers need not fear but what well-grown Eastern apples will bring a remunerative price.

As an evidence that other parts of the country are beginning to recognize the advantages of the East, we are receiving a number of inquiries from some of the Western apple-growing States regarding the possibilities for fruit-growing in New England, the price of land, labor, and other conditions which bear upon successful fruit growing.

As evidences of the practical bearing of the interest in fruit-growing we note that on every hand old orchards are being pruned, cultivated, fertilized, and sprayed, and many new trees are being set out both by owners of old orchards, and by those who are taking up the venture for the first time.

There are still some drawbacks to the thoroughly successful development of fruit-growing in the State. One of the most important needs of the present day is that of an adequate inspection law such as has long been in force in States, where fruit-growing has reached a more complete development. One of the first questions asked by our Western correspondents is "Do all your people give adequate care to their trees, and if not, what protection has the grower from pests bred in a careless neighbor's orchard?"

All our agricultural organizations are thoroughly in favor of an up-to-date inspection law, and our growers, so far as they have been sounded in the matter, are almost unanimous in its support. It would seem, therefore, as if it were about time that our legislature recognized this demand and enacted a law based on the experiences and practices in our best fruit-growing States.

Another need is a continuation of the demonstrations to cover orchard pests and diseases other than the San Jose scale. These should teach the best methods of treating the coddling moth, the bud moth, canker worms, tent caterpillars, etc., as well as some of the more important fungous diseases. And finally, we need adequate instruction in the best methods of fertilizing, pruning, thinning, harvesting, and marketing, so that we may produce the highest quality of orchard products and place them on the market in such a manner that they shall bring all they are worth in comparison with fruits from other States.

In small fruits there is an equally good opportunity for development. Our markets have never been fully supplied with good, well-grown and well-packed raspberries, blackberries, gooseberries, currants, and strawberries. These fruits can, of course, be shipped in from States farther south, and our markets are fairly well-supplied in that way, but such fruit is never as fresh and attractive, or of as good quality, as that which is home grown and which reaches the consumer's table almost the very day it is gathered.

We have a number of small-fruit plantations that are growing excellent fruit at the present time, but the supply is far from adequate. We have plenty of land which can be utilized for small-fruit growing, and the industry only needs such encouragement as has been given to orcharding during th past two or three years in order to bring it up to a satisfactory and flourishing condition.

## CATTLE INSPECTION.

During the year 1910 there were condemned and killed as affected with tuberculosis 493 head of live stock divided as follows: 480 cows, 2 oxen, 4 bulls, 7 swine. Of this number two cows proved to be free from tuberculosis. The number of cattle killed is less than the number killed in 1909 by one hundred seventeen. Six thousand two hundred seven head of cattle were examined physically by the cattle commissioners of the several counties, and the tuberculin test was applied to forty animals. Of the number to which the tuberculin test was applied seven, or seventeen per cent., reacted, and about seven per cent. of the cattle examined physically were condemned. The barns where the affected animals were confined were in each case disinfected according to law. A rule was adopted whereby it was provided that the State Veterinarian have the authority to apply the tuberculin test in all cases where such test was requested by the owner of the cattle, and also instructing the cattle commissioners when called to examine cattle to make examination of all cattle on the premises, and further instructing the cattle commissioners to examine all cattle which they suspected had tuberculosis. We find that, generally speaking, the rules met with approval, though in some cases there was much objection on the part of some owners of cattle. The owners who have objected to the more general inspection of cattle have based such objection on the fact that the State does not allow enough for the cattle condemned and killed, and it is urged that a greater allowance should be made for the cattle condemned and killed.

We submit to you that dairying on the farms of this State is on the decline, and this in spite of the fact that within easy access of any dairy farm of the State the milk producer has one of the best markets in the country. Reports have come to our attention of conditions in a section of the State, where formerly were to be found from ten to twenty head of live stock on each farm formerly occupied by prosperous farmers, who made their money in dairying, to the effect that a farmer living on one of the main roads of the town is obliged to drive five miles for milk for the family use, and other reports to the effect that in an agricultural community one of the farmers sold the milk produced on his farm to the occupants of other farms in the vicinity. It is estimated that if milk which is produced in Rhode Island and sold in Providence was distributed equally among the 225,000 inhabitants of the city, there would be about seventeen one-hundredths of a quart for each inhabitant.

It is estimated that two-thirds of the milk consumed in the city of Providence comes from without the State, and certainly the decrease in the dairy business is not due to the want of a market in which to dispose of the milk that could be produced on the farms in this State. We attribute the decline in the dairy business to the failure on the part of the middlemen to deal fairly with the farmer. The price received by producers is in many cases below the actual cost of production, and in no case, the food value of milk considered, does the producer receive a fair price for his milk. As hereinbefore indicated the average farm value of milk is four cents per quart and most of the consumers in Providence paid nine cents per quart, for milk during the past two months, and are now paying that price. The cost of transportation for milk will, in most cases, not exceed one-half cent per quart, and the cost of delivering and handling milk has been estimated not to exceed two cents per quart. It is at once apparent where the earnings from the hard toil of the farmer employed in this particular line of business goes, and certainly there is no line of farming that requires more capital, more hard work, patience, and long hours than does the dairy business. Wipe out the dairy business and farming in this State will be crippled, for from the keeping of live stock, and chiefly the dairy animals, do we get the fertilizer for use in restoring worn out fertility to the soil. Without such fertilization successful farming will not and cannot go on. It is urged that some of the dairymen have not been successful for the reason that they do carry on their business in an economical manner, and yet some of the same men who are now giving up the dairy business were formerly successful and when they carried on the business in the same manner as at the time of their retirement. Condensed milk has, by reason of a preference given to it by the laws of this State, taken the place in the household of milk in its natural state. By a peculiar omisson in the law of this State there is nothing providing that condensed milk shall come up to the standard required in the case of sale of raw, whole milk. We submit that a product coming from without the State should not be given a preference over the milk produced on the farms of this State, and that there should be a provision in the law which will require that the can or package containing condensed milk shall have printed thereon a formula for mixing such milk with water, and that when so mixed it shall come up to the standard required in the case of raw whole milk.

There should be created with all possible haste, the office of dairy instructor, to act under the direction of the State Board of Agriculture. The instructor should be required to visit all the dairies in the State and make examination of the same, giving instructions where necessary, looking to the sanitary condition in the stables and milk houses, the sanitary handling of milk and should have the power to enforce the instructions. It should also be provided that he have the power to issue, in the name of the State, a score card showing the points scored in the cases examined and provide for a publication of the details contained on the score card.

By some oversight at the time of an amendment to the law in relation to this Board, a provision authorizing the cattle commissioner to kill cattle he thought to be tuberculous in case such cattle were liable to die before the arrival of the veterinarian, was omitted. We recommend that this law be restored.

We request, as we requested one year ago, that there be an increase in the amount generally appropriated for use by the State Board of

Agriculture in order that there may be a more general inspection of the cattle in the State. In our opinion, an increase of ten thousand dollars would permit of the inspection of all the dairy animals in the State and the payment of the amount allowed for cattle condemned.

We recommend the passage of a law providing that no cattle be allowed to enter the State unless they have been tested with tuberculin, or unless upon permission form this department, and if not tested before coming to this State, that within a reasonable time after the arrival of the cattle in the State they be subjected to the tuberculin test. We believe that it is for the best interest of the farmers that there be such a law, as it will insure to him that, in so far as the best known diagnostic agent can determine, the animals that he purchases from without the State are free from tuberculosis.

A great many cattle are brought to this State annually, and there is very little livestock raising carried on in the State. It is generally recognized that it is cheaper to raise cattle than to buy them when raised, and there is much idle pasture land in the State which should be utilized by raising livestock as well as in other ways. The high prices offered by butchers for veal has had the effect of practically wiping out the business of raising livestock on the farms in the State.

We believe that some steps should be taken to permit of an examination of the slaughter-houses by the State Inspector of Beef and Pork, either by the enactment of new laws or by an increase of the amount of money to enable such inspection. The cattle commissioner for Providence county and the State veterinarian have directed attention to the fact that a few of the owners of cattle, who were dissatisfied with the appraisal as made by them, have informed the officers that they had been offered more money for their cattle by butchers. While we have been unable to trace any violation of the law in relation to the sale of cattle known to be diseased, there is altogether too great a possibility of diseased cattle being killed and sold for beef. We believe the inspection of slaughter-houses would reduce the possibility to a minimum.

## ENTOMOLOGICAL WORK.

The work of the Board and its officers in this particular direction has increased very considerably. The report of Prof. A. E. Stene, who has charge of this particular line of the work, shows that the box-leaf-miner and the birch-leaf skeltonizer are among the insects that were found in the State for the first time during the year. We have had requests for work against mosquitoes and the house fly. In the examination of nurseries it was found that the general condition of such nurseries is good. Fifteen nurseries were examined, and eleven were found sufficiently free from insects to receive a certificate. Through arrangement with the United States Department of Agriculture the nursery inspector was informed of consignments of nursery stock from abroad and in this way most of the nursery stock that came into the State was examined. No injurious insects or serious plant diseases were found in the nursery stock.

The work of spraying for the elm-leaf beetle and tussock moth was carried on in the same manner as in previous years, viz: by coöperation with the towns in which the work was done, the State furnishing the spraying apparatus, men to do the work of spraying and the spraying material, and the towns and cities furnished assistance. In the city of Providence the State assisted by furnishing spraying material and the wages of the men employed on the trees. The towns in which spraying was done are as follows: Glocester, North Scituate, Barrington, Woonsocket, Pawtucket, Newport, Warren, Cranston, and South Kingstown. The trees at the State Home and School were also sprayed. Nine thousand pounds of arsenate of lead was used, and about 18,000 trees were sprayed. The reports of the outcome of the work are to the effect that it was satisfactory.

We believe that this work should be continued and that the sum of two thousand dollars should again be appropriated with which to carry it on.

The gypsy and brown-tail moth work has been carried on in the same manner as in former years, viz.:—in coöperation with the United State Department of Agriculture. Because of the small amount of money available at the commencement of the year we were not able to burlap as many trees as in former years. We covered the sections which were suspected to be still infested, burlapping in all 170,000 trees. Twelve complete inspections were made of the whole territory and a number of extra inspections were made of the especially bad places. Thirteen thousand one hundred and eleven caterpillars and 2,780 pupæ were found and destroyed. Two thousand one hundred twenty-six egg clusters were creosoted. In addition to this work there has been a good deal of work done, such as scraping of trees, cutting down worthless ones, patching, pruning, burning over stone walls, brush, etc.

Were it not the fact that a new infestation was discovered in Woonsocket the decrease in the numbers of this pest would be marked, but taking the new colony into consideration, the numbers of the gypsy-moth are about the same. A special effort has been made to clean out the new colonies in order to prevent further spread from them.

The brown-tail moth situation is more alarming than it has been at any time in the past. A number of crews have been at work for nearly two months in Pawtucket, Cranston, South Providence, East Providence, and Newport, and destroyed 32,000 winter nests. Reports received show that this pest is spread from Portsmouth and Tiverton in the south along the east side of the bay to Providence, and northward through Pawtucket and Central Falls to Woonsocket and the Massachusetts line. On the west of the bay the territory is bounded on the south by the Pawtuxet river, and on the west by a line extending from Howard and the State Institutions northward through North Smithfield to the Massachusetts line. With the funds at our disposal we were unable to carry sufficiently large crews to cover all of the territory prior to the first of the present year, and whether or not all the infested territory can be covered before the expenditure of the balance of the appropriation will depend largely on how thickly infested the uninspected territory may be.

For the purpose of carrying on the work of suppression of the gypsy and brown-tail moth work during the present year we recommend the appropriation of the sum of ten thousand dollars.

The San Jose scale work has been carried on in the same manner as in former years, that is, by carrying on demonstrations in different parts of the State. The demonstrations were held in the orchards, and started with a description of the San Jose scale, calling attention to the appearance, and instructing the persons present as to how to find the scale readily. Methods of treatment were then taken up with a discussion of the best solutions for different seasons of the year. The spray outfit was described, and attention was called to the essential feature in the construction of the pump, as well as accessories, such as hose extension pipes, nozzles, etc. Methods of mixing the different spray materials was then taken up, and attention was called to the importance of thoroughness in the work. In addition to the demonstrations, 10,846 trees in orchards in different parts of the State were sprayed, and instructions given at demonstration above outlined were also given to the individual orchard owners.

This work should be continued, and in addition to spraying for the San Jose scale we should also have sufficent funds with which to carry on demonstations to show the best method to control the coddling moth, the bud moth, etc.

In order that this may be done, we recommend that the sum of at least twenty-five hundred dollars be appropriated.

Under the law passed at the January session of the General Assembly last year at the request of the Board authorizing the appointment of an Inspector of Apiaries, Prof. A. E. Stene, of Kingston, was elected Instpector of Apiaries. He or his deputy visited twenty-five places during the year and made examination of two hundred hives. No serious diseases were discovered and none have been reported. There is now being prepared a bulletin dealing with beekeeping as adapted to Rhode Island conditions.

## SHEEP.

The sheep industry in the State of Rhode Island has really gone to the dogs. It is estimated that on January first, this year, there were 7,500 sheep of shearing age on the farms in this State. On January 1, 1891, there were 20,433 sheep in the State. It will be noted that within twenty years there has been a decrease of about seventy-five per cent. in the number of sheep on the farms of this State.

On a number of the farms now idle and commonly called abandoned farms there were, according to the older inhabitants of different sections of the State, large flocks of sheep, and sheep raising was a very profitable line of farming. To what condition may this enormous decrease in the sheep-raising industry be attributed? Certainly not to the fact that there is no demand for wool or for mutton. In the days when sheep-farming was successfuly and profitably carried on, the cost of raising sheep and the price for mutton and wool offered less inducement to the farmer to engage in sheep raising than the prevailing prices offered to day. We submit that the decline and oftentimes failure in sheep raising is due to the ravages of the dogs. If this line of farming is to be protected by law, and we submit that it is of sufficient importance to the State to receive protection from it, there must be some radical amendment to the present law entitled "Of dogs," which affords little , if any, protection to sheep or other livestock on the farms of this State.

We recommended to the General Assembly in our report for 1908 and 1909, the passage of a law authorizing any person upon whose land any dog might be found, whether licensed and collared according to law or not, to kill such dog if it were unaccompanied by the owner or keeper thereof, or their duly authorized agent. We believe that such a law would be the most effectual way of preventing damage to sheep and other livestock and renew the recommendation. The bills which have been before the General Assembly pertaining to this particualr phase of the dog question have been opposed by owners and keepers of dogs residing in some of the cities of the State, who have undoubtedly been swayed by sentiment for the dog, giving no consideration whatever to the injury that might come to the farmer from the ravages of that animal. It has been our experience that well-trained dogs do not wander from the premises of the owner or keeper unless accompanied, and the person owning a dog of this kind has nothing to fear from such a law.

We also submit that sections 15 and 16 of Chapter 135 of the General Laws should be amended so as to remove the many technicalities incident to proof of damage done by dogs by the person whose livestock is injured or killed by dogs. The time within which notice of damage must be given to the appraiser after notice of loss should not be limited to two days. A reasonable time should be allowed. It should not be required of the owner of livestock injured or killed that he notify the appraiser living nearest to him, for there may be some confusion in this respect. The owner of such livestock should not be required to pay the appraiser one dollar for his services in appraising the damage and twenty-five cents a mile for travel. The appraiser is an officer of the town, and should receive his compensation for his services from the town. Failure to comply with these requirements is a sufficient defence by the town to an action brought against it to recover the amount of damage done by dogs. We also recommend that section 3 of Chapter 135 of the General Laws be so amended that the owner of live stock which shall have been injured by any dog shall have and recover from the owner or keeper of such dog thrice the amount of damage done by such dog.

We recommend an amendment to the present law in relation to bounties on foxes by which there will be a provision that any person killing a fox shall, upon the presentation of proof in proper form, have and receive from the State the sum of five dollars. Foxes are not only doing a great deal of damage to the poultry on farms, but are also killing some of the game birds, which protect in a great way the crops of the State from the ravage of injurious insects. The present bounty of three dollars offers no inducement to the hunter or other person to pursue and kill the fox.

The deer are doing a great deal of damage to fruit trees in the State, and we have had requests from several people to take up with the General Assembly the question of providing for an open season on deer or of a bill providing for compensation by the State to persons for damage done by deer. We submit that the many people who are now going into the orchard business and setting out young trees which suffer severely from the depredations of the deer should have protection in some way or other from the damage done by animals protected by law.

## IDLE AND UNPRODUCTIVE FARM LAND.

The last agricultural census shows that there is a total acreage of 442,000 in all the farm lands of the State, of which but 178,000 acres are improved. At least one-third of this unimproved acreage can be profiably and successfully cultivated, and there is an ample market for all produce, that can be grown in the State, within its borders.

It is the desire of this Board that every available foot of land within the State be cultivated and made to yield to its fullest capacity. Realizing the importance to the State of having the numerous idle and unproductive farms within its borders settled and cultivated, and finding, after investigation, that there was a considerable interest in the farm lands of Rhode Island, the State Board of Agriculture called a conference of the representatives of the granges, State College, and various other agricultural organizations in the State to consider the matter. There were present at the conference the Master of the State Grange, the President of the Rhode Island State College, the Director of the Rhode Island Agricultural Experiment Station, the State Forester, and numerous other people, who were interested in the matter. The advisability of publishing a list of available farm property for sale was discussed, and the following vote was passed by by the conference:

"RESOLVED: (1) That this meeting express to the Board of Agriculture its appreciation of its effort to repopulate the country section of the State; (2) That we regard the question of relieving congestion and utilizing the land to its full capacity as a most important work of our time; (3) That we urge the board to prosecute this work (a) by collecting a list of farm opportunities for settlement, (b) by circulating this list in the cities, and (c) by any other methods their experience may suggest."

The secretary of the Board was instructed to proceed in the collection of the information. Because of lack of funds we were obliged to carry on the work through the mails and by distributing posters all over the farming section. In the posters it was set out that any farm property that was for sale should be listed with the State Board of Agriculture, on blanks provided by the Board for that purpose, and that the information when compiled would be printed and distributed to the people of the State and others who inquired for them. The work could not be carried on as thoroughly as it should in this manner, and but twenty-five farms were listed with this department as for sale. Repeated letters to grange officers and other people in different parts of the State, requesting that the proposition of this Board to publish in pamphlet form a list of farms for sale, be kept before the land owners in their locality, failed to bring more returns than above indicated. His Excellency, Governor Pothier recognizing the importance of this work addressed a special message to the General Assembly at the August session, 1910, and recommended that this matter be given consideration, and also recommending that an appropriation be made to enable the carrying on of the work. An act was passed creating a State Conservation Commission, consisting of the Commissioner of Industrial Statistics, Commissioner of Forestry, Secretary of the State Board of Agriculture, the Secretary of the Metropolitan Park Commission, and the Director of the Rhode Island Agricultural Experiment Station, to have to do with matters concerning the State's natural resources, and the work is now going on. We recognize this work as of great importance to the agricultural interests of the State, and believe that it will result in the bringing about of a settlement and cultivation of many of the idle and uncultivated acres of land within its borders.

## FARMERS' INSTITUTES.

There has been a steady progress in this branch of the work of the Board, and the year 1910 was the banner year from the points of interest shown, variety of subject, number of institutes held, and attendance.

Seventeen institutes were held, with a total of twenty-one sessions and an estimated total attendance of three thousand people. The subjects discussed at the institutes were in relation to Dairying, Care of Milk, Care of Cattle, Care of Barn where Animals are Confined, Feeding of Cattle, Spraying, Home Economics, Culture of Land, Fertilizers, Poultry, including care and feeding, proper feed with a a view to egg production, Construction of Poultry houses, Incubators and Incubation,Orcharding, Corn Culture, and Selection of Seed Corn.

At least one institute was held in each county in the State, as required by law. The difficulty of getting the farmers out to the meetings seems to be overcome, and there has been a hearty response to our appeals for attendance at the meetings and a thorough interest in the lectures, as manifested by the discussions following each lecture.

In the line of educational work the school garden system carried on in the cities of Providence, Pawtucket, and Newport by this Board, the Rhode Island State College, and the League of Improvement Societies has been further extended. The expense of the work was paid as follows: the State College paid the salary of the instructor, the State Board of Agriculture paid for seeds, plowing, fertilizer, stakes, garden utensils, traveling expenses of instructor, etc., and the League of Improvement Societies provided prizes for the best gardens. A total of five hundred and sixty-two gardens were cultivated by the children in the different schools and seven hundred and six children and ninety students and prospective teachers at the State Normal School were reached directly through the school garden work.

There were also carried on in different sections of the State a number of demonstrations showing the best methods for controlling the San Jose scale, a more detailed report of this branch of the educational work appearing hereafter.

We have given numerous farmers information as to how to combat various injurious insects and also information as to the best method to prevent injurious insects and plant diseases from getting to plants, shrubs, etc. We have also given advice as to the adaptability of land for the growing of certain crops, and as to orcharding, etc.

The Agricultural Societies, the Rhode Island Poultry Association, the Rhode Island Horticultural Society, and the Newport Horticultural Society have reported to this Board, showing expenditures of money received from the State, as required by law, which warrants an appropriation for another year.

There has been creditable exhibitions held by each organization showing the agricultural and horticultural products of the State.

In the line of valuable legislation for the benefit of the farmer and of the citizen as a whole we recommend the passage of a law creating the office of State ornithologist to investigate the distribution and food habits of birds, to determine the relation of birds to outbreaks of insects, and to experiment with a view to discovering the best methods of protecting fruit and crops against birds. We recommend that the person to be appointed receive nothing for his services other than his travelling expenses. There has been discovered in the neighboring State of Connecticut a bird known as the starling, which is very destructive to fruits, etc. While we have not heard of its presence in this State, we consider that it would be well to have an officer charged with making investigation as to its presence in the State, and to take steps to prevent its spread.

We renew our recommendation, of the two past years, that there be enacted a law providing for seed inspection. As we stated at the time, there are altogether too many worthless seeds and too many seeds containing weed seeds offered for sale, all to the detriment of the farmer.

The State College had a very successful year, and there has been a considerable increase in the attendance. There is a crying need for new buildings at the College, especially a new chemistry building and a building for botany. These buildings are by no means in keeping with the other buildings at the institution and in no measure are adequate for the housing of the students.

We desire to acknowledge the coöperation and assistance of the State, Pomona, and subordinate granges, the different agricultural societies, the poultry associations, the horticultural societies, the Rhode Island State College, the Experiment Station, and last, but not least, the press; the last mentioned for the assistance in giving notice of different agricultural meetings and, in many ways, encouraging agriculture in the State, and the others for their advice and assistance in numerous matters. With the continued assistance of the different agencies we predict a bright future for agriculture in this State.

Respectfully submitted,

*R. I. State Board of Agriculture.*

JOHN J. DUNN,

*Secretary.*

# CATTLE COMMISSIONER'S REPORT.

*Table showing Number and Kinds of Cattle Paid for by State Board of Agriculture During Year* 1910.

## PROVIDENCE COUNTY.

| | *Oxen.* | *Cows.* | *Bulls.* | *Swine.* | *Sheep.* |
|---|---|---|---|---|---|
| January | 0 | 25 | 0 | 0 | 0 |
| February | 1 | 25 | 0 | 0 | 0 |
| March | 0 | 31 | 0 | 0 | 0 |
| April | 0 | 22 | 0 | 0 | 0 |
| May | 0 | 43 | 0 | 0 | 0 |
| June | 0 | 20 | 0 | 0 | 0 |
| July | 0 | 27 | 0 | 0 | 0 |
| August | 0 | 13 | 0 | 0 | 0 |
| September | 0 | 26 | 0 | 0 | 0 |
| October | 0 | 34 | 0 | 1 | 0 |
| November | 0 | 25 | 0 | 1 | 0 |
| December | 0 | 28 | 1 | 1 | 0 |
| | 1 | 319 | 1 | 3 | 0 |

## WASHINGTON COUNTY.

| | *Oxen.* | *Cows.* | *Bulls.* | *Swine.* | *Sheep.* |
|---|---|---|---|---|---|
| January | 0 | 2 | 0 | 0 | 0 |
| February | 0 | 2 | 1 | 0 | 0 |
| March | 0 | 4 | 0 | 2 | 0 |
| April | 0 | 8 | 0 | 0 | 0 |
| May | 0 | 2 | 0 | 0 | 0 |
| June | 0 | 6 | 0 | 0 | 0 |
| July | 0 | 1 | 0 | 0 | 0 |
| August | 0 | 6 | 0 | 0 | 0 |
| September | 0 | 3 | 0 | 0 | 0 |
| October | 0 | 5 | 0 | 0 | 0 |
| November | 0 | 2 | 0 | 1 | 0 |
| December | 0 | 5 | 0 | 0 | 0 |
| | 0 | 46 | 1 | 3 | 0 |

## Newport County.

| | *Oxen.* | *Cows.* | *Bulls.* | *Swine.* | *Sheep.* |
|---|---|---|---|---|---|
| January | 0 | 6 | 0 | 0 | 0 |
| February | 0 | 3 | 0 | 0 | 0 |
| March | 0 | 6 | 1 | 0 | 0 |
| April | 0 | 8 | 1 | 0 | 0 |
| May | 0 | 8 | 0 | 0 | 0 |
| June | 0 | 6 | 0 | 0 | 0 |
| July | 0 | 6 | 0 | 0 | 0 |
| August | 0 | 6 | 0 | 0 | 0 |
| September | 0 | 5 | 0 | 0 | 0 |
| October | 0 | 4 | 0 | 0 | 0 |
| November | 0 | 4 | 0 | 0 | 0 |
| December | 0 | 2 | 0 | 0 | 0 |
| | 0 | 64 | 2 | 0 | 0 |

## Bristol County.

| | *Oxen.* | *Cows.* | *Bulls.* | *Swine.* | *Sheep.* |
|---|---|---|---|---|---|
| January | 0 | 0 | 0 | 0 | 0 |
| February | 0 | 0 | 0 | 0 | 0 |
| March | 1 | 1 | 0 | 0 | 0 |
| April | 0 | 0 | 0 | 0 | 0 |
| May | 0 | 1 | 0 | 0 | 0 |
| June | 0 | 0 | 0 | 0 | 0 |
| July | 0 | 0 | 0 | 0 | 0 |
| August | 0 | 1 | 0 | 0 | 0 |
| September | 0 | 1 | 0 | 0 | 0 |
| October | 0 | 1 | 0 | 0 | 0 |
| November | 0 | 2 | 0 | 0 | 0 |
| December | 0 | 0 | 0 | 0 | 0 |
| | 1 | 7 | 0 | 0 | 0 |

## KENT COUNTY.

| | *Oxen.* | *Cows.* | *Bulls.* | *Swine.* | *Sheep.* |
|---|---|---|---|---|---|
| January | 0 | 1 | 0 | 0 | 0 |
| February | 0 | 4 | 0 | 0 | 0 |
| March | 0 | 2 | 0 | 0 | 0 |
| April | 0 | 8 | 0 | 0 | 0 |
| May | 0 | 1 | 0 | 0 | 0 |
| June | 0 | 4 | 0 | 1 | 0 |
| July | 0 | 3 | 0 | 0 | 0 |
| August | 0 | 5 | 0 | 0 | 0 |
| September | 0 | 4 | 0 | 0 | 0 |
| October | 0 | 6 | 0 | 0 | 0 |
| November | 0 | 3 | 0 | 0 | 0 |
| December | 0 | 3 | 0 | 0 | 0 |
| | 0 | 44 | 0 | 1 | 0 |

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*To the Honorable Secretary of the Board of Agriculture:*

As Cattle Commissioner for Bristol County for the year ending December 31st, 1910, I beg to submit my report.

There has been a slight increase in tuberculosis, probably due to climatic influences, experience in diagnosis, and a more acute appreciation of its danger. It is gratifying as I look back upon the past to observe that the improvement in the care, sustenance, sanitation and cleanliness of the herds is so much advanced. Farmers naturally conservative realize the necessity of responding to the public demand for improved conditions, though it has imposed upon them increased labor and increased cost, indeed it may be doubted whether the advance in price of milk has been commensurate with the increased cost of production. Having induced the farmer to furnish milk under improved conditions, should not some demand be made of the consumer to aid the farmer by furnishing cleaner receptacles for the milk delivered. I have been selling milk for forty years, and in some instances have been obliged daily to wash and cleanse the pitchers or cans into which the milk was to be placed. I think that many complaints of milk are attributable to this lack of cleanliness on the part of the consumer.

Respectfully,

WILLIAM WILLIAMS.

*To the Honorable State Board of Agriculture:*

Gentlemen:—As Cattle Commissioner for Little Compton I submit my report for the year ending December 31, 1910.

| | |
|---|---|
| Number of cattle examined | 129 |
| Number of cattle killed | 10 |
| Number of barns disinfected | 9 |

Respectfully submitted,

GEO. T. HOWARD.

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Anthony, January 17, 1911.

Mr. John J. Dunn,
*Secretary of the State Board of Agriculture,*
Providence, R. I.

My Dear Sir:—I have the honor to submit the following report for the year ending December 31, 1910.

During the past year in attending to my duty as Cattle Commissioner, I have examined 387 head of cattle, released 248 head that were brought into the State, and have travelled 1,575 miles approximately. Forty-four head of cattle have been slaughtered under the direction of the State Veterinarian and all found to be tuberculous but one. All stables have been disinfected where the animals were found to be diseased. I have also been called to examine four hogs, one was found to be tuberculous.

Respectfully submitted,

JOB MANCHESTER,
*Commissioner for Kent County.*

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*To the Honorable State Board of Agriculture:*

Gentlemen:—As Cattle Commissioner for Providence County I beg to submit herewith my report for 1910.

| | |
|---|---|
| Local cattle examined | 2,092 |
| Local cattle suspicious | 401 |
| Local cattle condemned (cows) | 313 |
| Local cattle condemned (oxen) | 1 |
| Local cattle condemned (bulls) | 1 |

| | |
|---|---|
| Cattle brought from other states for dairy purposes | 1,548 |
| Cattle brought from other states suspicious | 14 |
| Cattle brought from other states condemned | 6 |
| Cattle brought from other states for beef | 874 |
| Swine examined | 5 |
| Swine condemned | 3 |
| Total number of cattle killed | 321 |
| Total number of swine killed | 3 |
| Total number of cattle bought into the state | 2,422 |

This year as last I would earnestly recommend to the Honorable Board the exaction of a tuberculin test for all cattle coming into the State for dairy purposes.

During the year, cattle which had reacted to the tuberculin test at Brighton were deliberately shipped to Rhode Island, to be sold at any price. The Massachusetts authorities claimed a breach of contract on the part of the shippers, and requested that the cattle be shipped back, that the culprits might be punished. The request was granted and the cattle were killed.

It is openly boasted, moreover, that Rhode Island is an easy mark for the disposition of cattle so slightly diseased that the tuberculin test, only, in many cases, can detect the disease. Such being the case it is reasonable to believe that shortly after those cattle arrive on the dairy farm, where they are "forced" to give as large a flow of milk as possible, that even under the most favorable conditions the tubercular germs spread and local cattle become affected. So that for the good of the Rhode Island dairymen, the welfare of the public, and the name of the State, I think it paramount to keep apace with the other leading states, to require the tuberculin test for cattle imported to Rhode Island for dairy purposes.

In regard to the prices of cattle I would respectfully call your attention to the greatly advanced prices as compared to those of 1908 and 1909. Occasionally, we condemn native cattle, and cattle that might well be called grades, were it possible to trace their pedigree, which are worth $100 to any dairyman, at the present time. Yet we are obliged to make our appraisal on the $50 basis. This basis seems to be low under existing conditions, and causes much unfavorable comment from the farmers. Many have requested me to ask the Board to consider a higher appraisal for A-1 cows, and I hope you will give the matter your careful consideration.

One other matter which I think the Board should strongly advocate is the municipal slaughter house. Often reports come to me from reputable persons, that animals which are badly diseased and unable to stand are drawn into out-of-the-way slaughter houses, and killed, and the meat sold for food. Several of the local butchers are in favor of the project. It certainly would safeguard the public against the sale of local beef that was unfit for market purposes.

In each case where tuberculous cattle were condemned the premises were disinfected as required by law.

Respectfully,

FRANCIS S. COLE,

*Cattle Commissioner for Providence County.*

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*To the Honorable Secretary of the Board of Agriculture:*

In accordance with your request I have the honor to submit the following report for the year ending December 31, 1910.

I have travelled by rail and private conveyances 7,969 miles and inspected 1,381 cattle and 109 hogs. I have released 2,113 head of cattle imported from other States, I have killed 40 tuberculous cows, one bull, one hog, two shoats.

The animals that have been slaughtered have been disposed of in a manner not detrimental to the public health.

Respectfully yours,

PHILIP A. MONEY,

*Commissioner for Washington County.*

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January 11, 1911.

*To the Honorable Secretary of the State Board of Agriculture:*

I have the honor to submit the following report for the year ending December 31, 1910.

Whole number of animals inspected, 112, of which six were found tuberculous and were disposed of in the manner provided by the State Board.

Respectfully submitted,

T. D. BABCOCK,

*Commissioner for Washington County.*

To Hon. J. J. Dunn.

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*To the Honorable Secretary of the Board of Agriculture:*

In accordance with your request I submit the following yearly report. I have travelled by trolley and private conveyances, 2,323 miles and inspected 570, and have released 775 head of cattle imported from other states. I have killed 54 tuberculous cows and 2 bulls. Have used the disinfectant to great advantage. I wish to state cattle having advanced to 25 per cent. making them such extreme prices I think people would be more willing to eradicate their herds if there be a change in the appraisal limit.

Respectfully,

WM. K. BOYD,

*Commissioner for Newport County.*

## REPORT FOR NEWPORT COUNTY, 1910.

*Number of Cattle Killed.*

Wm. K. Boyd.

| | *Cows.* | *Bulls.* |
|---|---|---|
| January | 6 | 0 |
| February | 2 | 0 |
| March | 6 | 1 |
| April | 3 | 1 |
| May | 7 | 0 |
| June | 5 | 0 |
| July | 6 | 0 |
| August | 6 | 0 |
| September | 5 | 0 |
| October | 4 | 0 |
| November | 3 | 0 |
| December | 1 | 0 |
| | 54 | 2 |

# VETERINARIAN'S REPORT.

*To the Honorable State Board of Agriculture:*

I herewith present my annual report as State Veterinarian for the year ending December, 1910, together with certain recommendations that I consider should be brought to your attention at this particular time. During the year I have travelled 11,500 miles within the borders of the State in the discharge of my duties and have examined 1,500 animals for the purpose of evidence that said animals were suffering from some form of contagious disease, principally tuberculosis. Of the above number 504 were condemned (two of which did not prove to have tuberculosis) consisting of 480 cows, 2 oxen, 4 bulls, 7 swine and 11 horses. Forty-two milch cows were tested with tuberculin at the request of the owners, seven of which reacted to the test and proved to be diseased. Regarding my recommendations to your Board, I would say at the outset that it is my opinion that certain changes in our laws should be made so that the work we are engaged in would give better satisfaction to those directly concerned. As will be noticed by comparing the number of animals destroyed this year, with those condemned during the year 1909, more than one hundred less animals have been killed than during the year 1909. This fact at first thought might indicate that your Board through its system of inspection, has decreased the amount of tuberculosis in the dairy herds of our State, but unfortunately I am unable to agree with those who differ from me regarding the same. Since you have adopted the rule that all animals upon the farm should be examined by your commissioners when they were notified by the owner that they had a suspicious animal, much dissatisfaction has arisen among owners of cattle in this State, at the low appraisals that have been given to them for many of the animals taken out and destroyed. It can readily be seen that by this method animals that have not reached the last stages of tuberculosis are discovered by your agents and removed while in an apparent good condition. Do not misunderstand me and think that I am of the opinion that this procedure is wrong, for I do not, but I do think that an increase in the price of animals should be made, so that the owners will work in harmony with your Board. One of the chief factors regarding the small number of animals killed this year has, in my opinion, been due to the high price of meat. For it is a well known fact that the State has been scoured from end to end by certain men who have not hesitated to buy any kind of a cow that was able to stand, and I am reasonably sure that many were animals that should have been killed by your agents, but were sold for higher prices than your Board could allow for them under the law. At the time our present law was passed, the prices appeared to be satisfactory, but since that time the value of all farm animals has increased a great deal, and when you take an animal from a man that has cost him seventy-five or eighty dollars and allow him the limit of price, twenty-five dollars, it does not make him feel very good, and some of them do not hesitate to inform your commissioners that they will be disposed of to better advantage if they have suspicion of others at any future time. The conditions related above are in my opinion the reasons why we have not had as many animals as last year and I think if a larger amount could be allowed for those destroyed, it would be the means of diverting more diseased meat from our small markets.

In regard to animals entering the State, I think it unnecessary for me to say anything at this time, for my views are too well known to the members of your Board upon that subject. I also think that all animals in the State should be physically examined at regular intervals and that your veterinarian should have assistance at such times as appear to be necessary in order that the work may be fully attended to.

Respectfully,

JOHN S. POLLARD,

*State Veterinarian.*

# Statement by the State Board of Agriculture Showing Expenditure of Money during the Year 1910.

| | |
|---|---|
| Amount paid for cattle | $9,631 00 |
| Paid in 1910 for cattle killed in 1909 | 148 50 |
| Paid cattle commissioners | 3,273 05 |
| State Veterinarian | 1,800 00 |
| Salary of secretary | 1,300 00 |
| Clerical assistance | 432 00 |
| School gardens | 339 45 |
| Farmers' institutes | 504 87 |
| Expenses of members attending meetings of the Board and Executive committee meetings | 129 60 |
| Printing, stationery, etc | 310 90 |
| Nursery inspection, apiary inspection, etc | 195 04 |
| Paid for supplies for veterinarian | 41 00 |
| Advertising | 36 50 |
| Telephone calls | 20 10 |
| Slides for use at institutes and laboratory supplies | 70 00 |
| Spraying outfit | 228 00 |
| Traveling expenses and other expenses of secretary | 170 00 |
| Miscellaneous expenses | 294 61 |
| Total | $18,924 62 |
| Unexpended balance | 1,075 38 |

In explanation of the above we will say that the law of this State provides that when cattle are condemned and killed as being affected with tuberculosis, one-half the appraised value as set by the Cattle Commissioner and the State Veterinarian will be allowed; provided that not more than fifty dollars shall be allowed for any single native animal, nor more than seventy-five dollars for any single grade animal, nor more than one hundred dollars for any single registered animal. Four hundred and ninety-three animals were killed during the year and it will be seen that the average amount paid is $19.53 per head.

The State Veterinarian receives a salary of $1,800.00 per year, from which he pays his own traveling expenses, excepting that in case he is obliged to drive a considerable distance from the railroad station to get to the point where the cattle are located the Cattle Commissioner furnishes a carriage for transportation and is allowed for the amount paid for carriage hire. The Cattle Commissioners receive $4.00 for each day actually employed, from which amount they are obliged to pay their own traveling expenses. The item for school garden work is for money paid for seeds, manure, stakes, twine, plowing and the traveling expenses of an instructor, and also $25.00 money paid to the Civic League of Newport to assist in the carrying on of a system of school gardens in that city. Under the head of Farmers' Institutes we have included money paid to lecturers, rents for halls, money paid for transcribing some of the lectures. Some of the lecturers receive $10.00 per lecture, some $5.00, and some serve for nothing only that their traveling expenses are paid. The law provides that the members of the Board shall receive no compensation other than their necessary traveling expenses. There were four meetings of the Board held and fourteen meetings of the Executive Committee. The Board is composed of ten members. In relation to the item for printing, stationery, etc., I will say that this includes money paid for letter heads, bill heads, stamped envelopes, list of institute speakers, tuberculin test blanks, reports of cattle commissioner, reports of veterinarian, rules in relation to disinfection of stables, receipts from rendering companies, programs for some of farmers' institutes, postal invitations to institutes, circular letters, etc. The bill for nursery and apiary inspection includes $39.95 for inspection of apiaries and the balance is for money paid to Prof. A. E. Stene and Alexander MacLellan. Under the head of supplies for veterinarian, I will say that this includes the cost of material used in disinfecting stables, cost for cartridges used in killing cattle, cost of tuberculin used in the testing of cattle, cost of thermometers, cost of hypodermic syringes, needles, etc. The bill for advertising is for money paid for advertising Farmers' Institutes and a bill of $15.00 which was rendered in

1909 for $25.00, but which we refused to pay on the ground that we thought it excessive. The reference to telephone calls is for toll calls. The slides for use at institutes will be used by the apiary inspector in his lectures on bee-keeping and laboratory supplies by Prof. Stene, in connection with the examination of insects, fungous diseases, etc. The spray outfit is for a power sprayer which is on the Island of Rhode Island and which will be used in the spraying of trees in that locality. The item for traveling expenses and other expenses of secretary, includes expenses attending institutes, such as railroad fare, lodging, meals, and carriage hire in some cases in getting to the institute hall, and also an allowance for traveling expenses in attending agricultural meetings other than Farmers' Institutes. Under the head of miscellaneous we have included cost of typewriting paper, office supplies, money paid for hose, arsenate of lead, spray solution, membership fee for the State in agricultural organizations, money paid C. W. Loveland for services in collecting and arranging injurious insects, and divers other small amounts.

There are seven cattle commissioners, one in Kent County, two in Washington County, one in Providence County, one in Bristol County, and two in Newport County.

Sub-statement accompanying statement of the State Board of Agriculture for the purpose of showing the amounts allowed to cattle commissioners for money paid by them for team hire to convey the State Veterinarian. *The cattle commissioners are not allowed anything for their own traveling or other expenses*, as appears on the statement to which this is attached.

| JANUARY | |
|---|---|
| Commissioner Williams... | 1 50 |
| Commissioner Money........ | 1 50 |
| Commissioner Boyd.......... | 4 00 |
| Commissioner Cole........... | 1 50 |
| | 8 50 |

| FEBRUARY | |
|---|---|
| Commissioner Williams...... | 1 50 |
| Commissioner Howard....... | 3 00 |
| Commissioner Manchester.... | 1 50 |
| Commissioner Cole........... | 2 00 |
| Commissioner Boyd.......... | 2 00 |
| Commissioner Babcock....... | 1 00 |
| Commissioner Money........ | 2 00 |
| | 13 00 |

March

| | |
|---|---|
| Commissioner Money | 2 00 |
| Commissioner Manchester | 4 50 |
| Commissioner Boyd | 2 00 |
| | 8 50 |

April

| | |
|---|---|
| Commissioner Williams | 1 75 |
| Commissioner Money | 4 00 |
| Commissioner Boyd | 2 00 |
| Commissioner Manchester | 1 50 |
| Commissioner Howard | 6 00 |
| | 15 25 |

May

| | |
|---|---|
| Commissioner Williams | 1 50 |
| Commissioner Money | 2 00 |
| Commissioner Howard | 3 00 |
| Commissioner Boyd | 4 00 |
| Commissioner Cole | 2 00 |
| | 12 50 |

June

| | |
|---|---|
| Commissioner Cole | 2 00 |
| Commissioner Money | 2 50 |
| Commissioner Manchester | 3 00 |
| Commissioner Boyd | 2 00 |
| Commissioner Babcock | 2 00 |
| | 11 50 |

July

| | |
|---|---|
| Commissioner Williams | 1 50 |
| Commissioner Money | 2 00 |
| Commissioner Howard | 3 00 |
| Commissioner Boyd | 6 00 |
| | 12 50 |

August

| | |
|---|---|
| Commissioner Money | 6 00 |
| Commissioner Cole | 1 50 |
| Commissioner Boyd | 4 00 |
| Commissioner Manchester | 2 50 |
| Commissioner Babcock | 2 00 |
| | 16 00 |

September

| | |
|---|---|
| Commissioner Williams | 1 50 |
| Commissioner Cole | 2 50 |
| Commissioner Manchester | 5 00 |
| Commissioner Boyd | 4 00 |
| Commissioner Babcock | 1 00 |
| Commissioner Money | 1 00 |
| | 15 00 |

October

| | |
|---|---|
| Commissioner Williams | 1 50 |
| Commissioner Money | 5 50 |
| Commissioner Cole | 4 00 |
| Commissioner Manchester | 5 50 |
| Commissioner Boyd | 6 00 |
| | 22 50 |

November

| | |
|---|---|
| Commissioner Money | 1 50 |
| Commissioner Boyd | 4 00 |
| Commissioner Manchester | 3 00 |
| Commissioner Cole | 5 00 |
| | 13 50 |

December

| | |
|---|---|
| Commissioner Money | 1 00 |
| Commissioner Cole | 1 50 |
| Commissioner Boyd | 4 00 |
| Commissioner Howard | 1 50 |
| Commissioner Manchester | 1 50 |
| | 9 50 |

The total amount paid to the cattle commissioners for the money paid by them for team hire to convey the Veterinarian was $158.25. They examined during the year 13,766 cattle, in the manner following, they were called upon or in some manner their suspicion was directed to 6,207 head of cattle, of which number they regarded 2,000 as showing symptoms to warrant the calling of the Veterinarian to pass his judgment. Five thousand five hundred and fifty nine were released at the Brighton, Mass., market and upon arrival in the State.

# RETURNS OF THE AGRICULTURAL SOCIETIES RECEIVING A BOUNTY FROM THE STATE.

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## RETURNS OF THE RHODE ISLAND POULTRY ASSOCIATION FOR THE YEAR ENDING DECEMBER 20, 1910.

### FINANCIAL STATEMENT.

| | |
|---|---|
| Received from cash on hand at date of last report | $51 40 |
| " " membership fees | 116 00 |
| " " sales of single admission tickets to fair | 647 80 |
| " " donations or subscriptions | 150 00 |
| " " all other entrance fees | 1,553 50 |
| " " rent of grounds for booths or other purposes | 160 00 |
| " " State appropriation | 1,000 00 |
| " " Ads in premium list and catalogue, sale of catalogue, rent of coops and sale of birds | 549 25 |
| Total receipts | $4,227 95 |
| Expended for running expenses of fair | $2,128 73 |
| " " all other premiums, gratuities, medals or diplomas | 1,453 00 |
| " " other expenditures | 277 45 |
| Cash on hand Dec. 21, 1910, to balance | 368 77 |
| Total | $4,227 95 |
| Indebtedness of society (if any, 85 ctf's of indebtedness) | 850 00 |
| Value of personal estate | 1,400 00 |
| Number of members | 120 |
| Total estimated attendance | 3,500 |
| Price of single admission tickets to the fair | 15 cts. and 25 cts. |

How is the personal estate invested or of what does it consist?

Exhibition coops and appliances.

## Analysis of Premiums and Gratuities Paid.

### FARM STOCK.

| | |
|---|---|
| Total amount awarded for live stock | $1,453 00 |

### MISCELLANEOUS.

| | |
|---|---|
| Number of people who received premiums | 160 |

WARREN R. FALES, President, Riverside, R. I.
WILLIAM I. BROWN, Secretary, Providence, R. I.
WILLIAM H. CONGDON, Treasurer, Oak Lawn, R. I.

## RETURNS OF THE NEWPORT COUNTY AGRICULTURAL SOCIETY, FOR THE YEAR ENDING DECEMBER 1, 1910.

### FINANCIAL STATEMENT.

| | |
|---|---|
| Received from cash on hand at date of last report | $1,226 40 |
| " " membership fees | 135 00 |
| " " sales of single admission tickets to fair | 972 95 |
| " " donations or subscriptions | 80 00 |
| " " rent of grounds for booths or other purposes | 243 89 |
| " " State appropriation | 1,000 00 |
| Total receipts | $3,658 24 |

| | |
|---|---|
| Expended for running expenses of fair | $722 20 |
| " " all other premiums, gratuities, medals or diplomas | 1,165 90 |
| " " permanent improvements | 156 00 |
| " " other expenditures | 50 00 |
| Cash on hand Dec. 1, 1910, to balance | 1,564 14 |
| Total | $3,658 24 |

| | |
|---|---|
| Value of real estate | $3,700 00 |
| Value of personal estate | 140 00 |
| Number of members | 45 |
| Total estimated attendance | 5,700 |
| Price of single admission tickets to the fair | 15 cts. and 25 cts. |

How is the personal estate invested or of what does it consist?

Chairs, canvas, show cases and coops.

### FARM STOCK.

| | |
|---|---|
| Amount awarded for all cattle | $147 50 |
| " " " horses (except speed) | 40 00 |
| " " " sheep | 37 00 |
| " " " swine | 35 00 |
| " " " poultry | 135 00 |
| Total amount awarded for live stock | $394 50 |

### FARM PRODUCTS.

| | |
|---|---|
| Amount awarded for Indian corn | $20 00 |
| " " " beans | 7 00 |
| " " " potatoes | 75 00 |
| " " " carrots | 3 50 |
| " " " beets | 8 00 |
| " " " turnips | 5 00 |
| " " " onions | 15 00 |
| " " " other root crops | 105 50 |
| Total amount awarded for grain and root crops | $239 00 |

| | |
|---|---|
| Amount awarded for fruits | $152 00 |
| " " " flowers | 72 75 |
| " " " butter | 2 50 |
| " " " honey and wax | 2 00 |
| " " " bread and cake | 21 15 |
| " " " preserved fruits, etc | 65 00 |
| Total amount awarded under the head of farm products | $315 40 |

### MISCELLANEOUS.

| | |
|---|---|
| Amount awarded for fine arts and fancy articles | $62 00 |
| " " " needlework | 122 00 |
| Number of people who received premiums | 304 |
| School works | 33 00 |

Isaac L. Sherman, President, Newport, R. I.
John M. Eldredge, Secretary, Bristol Ferry, R. I.
Edward R. Anthony, Treasurer, Portsmouth.

## RETURNS FOR THE NEWPORT HORTICULTURAL SOCIETY, FOR THE YEAR ENDING DECEMBER 1, 1910.

### FINANCIAL STATEMENT.

| | |
|---|---|
| Received from cash on hand at date of last report | $117 88 |
| " " membership fees | 330 25 |
| " " sales of single admission tickets to fair | 56 25 |
| " " donations or subscriptions | 330 00 |
| " " State appropriation | 1,000 00 |
| " " other sources | 338 05 |
| Total receipts | $2,172 43 |
| Expended for running expenses of fair | $484 64 |
| " " all other premiums, gratuities, medals or diplomas | 1,284 52 |
| " " other expenditures | 180 58 |
| Cash on hand Dec. 1, 1910, to balance | 222 69 |
| Total | $2,172 43 |
| Number of members | 141 |
| Total estimated attendance, paid and free admissions | 2,500 |
| Price of single admission tickets to the fair | 25 cents. |

### FARM PRODUCTS.

| | |
|---|---|
| Total amount awarded for grain and root crops | $129 00 |
| Amount awarded for fruits | 117 00 |
| " " " flowers | 1,011 52 |
| " " " preserved fruits, etc | 27 00 |
| Total amount awarded under the head of farm products | $1,284 52 |

### MISCELLANEOUS.

| | |
|---|---|
| Number of medals awarded, 6 silver, one bronze | 7 |
| Number of diplomas awarded | 47 |
| Number of people who received premiums | 230 |

ANDREW S. MEIKLE, President, Newport, R. I.
DANIEL J. COUGHLIN, Secretary, Newport, R. I.
A. K. MCMAHON, Treasurer, Newport, R. I.

## RETURNS OF THE WASHINGTON COUNTY AGRICULTURAL SOCIETY, FOR THE YEAR ENDING NOVEMBER 1, 1910.

### FINANCIAL STATEMENT.

| | |
|---|---|
| Received from cash on hand at date of last report | $2,778 81 |
| " " membership fees | 50 00 |
| " " sales of single admission tickets to fair | 6,614 50 |
| " " admissions to grand stand (if any) | 950 00 |
| " " entrance fees on trials of speed | 137 50 |
| " " all other entrance fees | 201 75 |
| " " rent of grounds for booths or other purposes | 1,937 80 |
| " " State appropriation | 1,500 00 |
| " " other sources (in detail) note | 200 00 |
| " " merchandise sold | 14 37 |
| Total receipts | $14,384 73 |
| Expended for running expenses of fair | $4,978 27 |
| " " purses or premiums for trials of speed | 1,737 50 |
| " " all other premiums, gratuities, medals or diplomas | 1,948 40 |
| " " permanent improvements | 807 57 |
| " " other expenditures, four notes | 1,750 00 |
| Cash on hand Nov. 1, 1910, to balance | 3,162 99 |
| Total | $14,384 73 |
| Value of real estate | 12,000 00 |
| Value of personal estate | 298 00 |
| Total estimated attendance, paid | 18,500 |
| Price of single admission tickets to the fair | 50 cents. |
| Price of single admission to grand stand | 15 cts. and 25 cts. |

### FARM STOCK.

| | | No. Exhibited. |
|---|---|---|
| Amount awarded for bulls | $77 00 | 27 |
| " " " milch cows | 205 00 | 129 |
| " " " heifers | 131 00 | 136 |
| " " " calves | 37 50 | 53 |

| | | |
|---|---|---|
| Amount awarded for working oxen (pairs) | $80 00 | 26 |
| “ “ “ steers (pairs) | 12 00 | 5 |
| “ “ “ fat cattle | 8 00 | 10 |
| “ “ “ horses (except speed) | 117 00 | 31 |
| “ “ “ horses (speed) | 1,737 50 | 40 |
| “ “ “ sheep | 66 50 | 103 |
| “ “ “ swine | 44 00 | 24 |
| “ “ “ poultry | 580 75 | 805 |
| Total amount awarded for live stock | $3,096 25 | |

### FARM PRODUCTS.

| | |
|---|---|
| Amount awarded for Indian corn | $5 00 |
| “ “ “ wheat | 1 00 |
| “ “ “ rye | 75 |
| “ “ “ oats | 75 |
| “ “ “ beans | 4 25 |
| “ “ “ potatoes | 20 00 |
| “ “ “ carrots | 1 50 |
| “ “ “ beets | 5 25 |
| “ “ “ onions | 11 25 |
| “ “ “ other root crops | 43 50 |
| Total amount awarded for grain and root crops | $93 25 |

| | |
|---|---|
| Amount awarded for fruits | $129 25 |
| “ “ “ flowers | 85 75 |
| “ “ “ butter | 6 00 |
| “ “ “ cheese | 3 00 |
| “ “ “ honey and wax | 11 50 |
| “ “ “ bread, cake and pies | 34 55 |
| “ “ “ preserved fruits, etc | 18 65 |
| Total amount awarded under the head of farm products | $288 70 |

### MISCELLANEOUS.

| | |
|---|---|
| Amount awarded for domestic manufactures, etc., not specified above | $61 00 |
| Amount awarded for fine arts and fancy articles | 120 40 |
| “ “ “ needlework | 58 20 |

| | |
|---|---|
| Number of Diplomas awarded | 1 |
| Number of people who received premiums | 553 |
| Drawing match | 25 00 |
| Grange exhibits | 150 00 |
| Children's exhibits | 36 40 |

Rowland G. Hazard, President, Peace Dale, R. I.
John A. Allen, Secretary, Peace Dale, R. I.
Jesse V. B. Watson, Treasurer, Wakefield, R. I.

# TABLES OF PRODUCTION AND FARM VALUE OF IMPORTANT FARM PRODUCTS, AND ESTIMATE OF AVERAGE FARM VALUE OF CATTLE, ETC.

## FROM "CROP REPORTER," U. S. DEPARTMENT OF AGRICULTURE.

*Average Value Per Head of Farm Animals on January 1 of Years Indicated, by States.*

| State or Territory. | Horses. | | | | | | | Milch Cows. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1911. | 1910. | 1909. | 1900–1909. | 1890–1899. | 1880–1889. | 1870–1879. | 1911. | 1910. | 1909. | 1900–1909. | 1890–1899. | 1880–1889. | 1870–1879. |
| Maine | $124.00 | $125.00 | $107.00 | $86.47 | $67.62 | $79.59 | $74.10 | $44.00 | $33.00 | $29.00 | $29.75 | $26.44 | $28.82 | $29.83 |
| New Hampshire | 118.00 | 106.00 | 98.00 | 82.04 | 63.30 | 76.30 | 71.20 | 48.50 | 36.20 | 32.00 | 32.14 | 27.32 | 29.80 | 32.40 |
| Vermont | 121.00 | 106.00 | 103.00 | 82.98 | 58.53 | 75.32 | 74.58 | 46.00 | 34.20 | 30.00 | 28.17 | 25.53 | 27.30 | 32.42 |
| Massachusetts | 148.00 | 128.00 | 116.00 | 98.62 | 83.71 | 98.88 | 95.67 | 49.00 | 42.00 | 40.00 | 38.63 | 33.16 | 35.09 | 40.77 |
| Rhode Island | 148.00 | 129.00 | 126.00 | 102.31 | 90.59 | 100.26 | 87.22 | 52.50 | 43.80 | 43.00 | 40.41 | 32.38 | 33.68 | 37.80 |
| Connecticut | 142.00 | 126.00 | 123.00 | 96.85 | 82.94 | 86.40 | 82.50 | 49.00 | 41.00 | 38.00 | 36.53 | 30.45 | 32.73 | 38.90 |
| New York | 131.00 | 125.00 | 114.00 | 93.74 | 70.47 | 89.70 | 83.63 | 48.50 | 39.50 | 34.25 | 33.82 | 27.53 | 31.54 | 33.64 |
| New Jersey | 142.00 | 134.00 | 124.00 | 101.62 | 80.80 | 98.90 | 104.69 | 53.50 | 47.50 | 45.50 | 40.92 | 34.65 | 36.29 | 43.55 |
| Pennsylvania | 137.00 | 132.00 | 116.00 | 91.91 | 65.38 | 87.48 | 81.91 | 44.50 | 39.00 | 37.00 | 33.75 | 26.71 | 30.55 | 32.55 |
| Delaware | 108.00 | 106.00 | 100.00 | 82.55 | 63.91 | 88.66 | 74.98 | 42.50 | 38.00 | 36.00 | 32.44 | 26.29 | 29.90 | 30.11 |
| Maryland | 110.00 | 108.00 | 100.00 | 78.51 | 59.86 | 77.97 | 75.39 | 37.50 | 37.30 | 33.00 | 30.30 | 25.03 | 29.88 | 29.24 |
| Virginia | 110.00 | 107.00 | 100.00 | 75.21 | 54.06 | 67.62 | 66.30 | 32.00 | 29.70 | 28.75 | 25.66 | 19.84 | 21.39 | 21.44 |
| West Virginia | 117.00 | 112.00 | 102.00 | 75.18 | 48.03 | 61.65 | 59.28 | 35.50 | 35.00 | 32.50 | 29.53 | 21.98 | 25.66 | 26.29 |
| North Carolina | 126.00 | 121.00 | 110.00 | 85.50 | 62.96 | 71.99 | 72.14 | 28.00 | 25.50 | 25.00 | 21.90 | 15.60 | 15.62 | 16.59 |
| South Carolina | 138.00 | 127.00 | 121.00 | 92.67 | 71.36 | 86.34 | 85.38 | 31.50 | 28.90 | 27.00 | 24.33 | 18.68 | 18.61 | 18.95 |
| Georgia | 130.00 | 125.00 | 116.00 | 91.70 | 64.67 | 78.62 | 81.48 | 28.50 | 25.00 | 23.50 | 24.01 | 18.22 | 16.71 | 17.03 |
| Florida | 113.00 | 109.00 | 104.00 | 77.94 | 58.00 | 76.56 | 81.70 | 35.00 | 32.50 | 26.50 | 23.39 | 15.64 | 14.15 | 13.40 |
| Ohio | 133.00 | 129.00 | 113.00 | 88.45 | 55.99 | 74.79 | 65.56 | 47.00 | 42.80 | 37.75 | 33.46 | 26.11 | 30.78 | 31.22 |
| Indiana | 128.00 | 122.00 | 107.00 | 84.14 | 53.24 | 70.86 | 56.88 | 44.50 | 41.00 | 35.50 | 32.06 | 24.83 | 28.68 | 27.51 |
| Illinois | 123.00 | 124.00 | 109.00 | 84.46 | 49.25 | 70.45 | 56.07 | 47.00 | 42.80 | 37.00 | 34.52 | 26.33 | 29.92 | 27.75 |
| Michigan | 129.00 | 126.00 | 110.00 | 87.90 | 61.96 | 82.30 | 71.41 | 43.50 | 39.50 | 35.25 | 33.13 | 27.17 | 31.03 | 30.82 |
| Wisconsin | 122.00 | 121.00 | 107.00 | 87.52 | 57.47 | 74.11 | 65.79 | 42.50 | 36.60 | 34.00 | 30.98 | 24.15 | 26.94 | 25.56 |
| Minnesota | 120.00 | 111.00 | 100.00 | 79.11 | 56.99 | 76.98 | 67.52 | 36.00 | 33.00 | 30.25 | 28.28 | 22.15 | 26.10 | 24.19 |
| Iowa | 121.00 | 120.00 | 103.00 | 77.96 | 47.48 | 69.82 | 58.25 | 40.00 | 36.00 | 34.00 | 30.97 | 25.10 | 27.17 | 24.92 |
| Missouri | 109.00 | 103.00 | 90.00 | 68.12 | 39.45 | 55.30 | 44.70 | 39.50 | 34.80 | 31.00 | 27.37 | 20.78 | 22.97 | 21.45 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Dakota | 110.00 | 114.00 | 101.00 | 75.91 | 52.72 | ...... | ...... | 35.50 | 33.90 | 30.50 | 29.44 | 21.73 | ...... | ...... |
| South Dakota | 106.00 | 105.00 | 93.00 | 63.40 | 45.18 | a76.40 | ...... | 35.50 | 33.00 | 30.00 | 28.17 | 21.16 | a28.83 | ...... |
| Nebraska | 106.00 | 108.00 | 91.00 | 66.17 | 43.18 | 72.52 | 66.56 | 37.50 | 35.00 | 31.00 | 29.51 | 22.30 | 28.06 | 28.25 |
| Kansas | 107.00 | 107.00 | 89.00 | 66.21 | 40.80 | 63.11 | 50.46 | 40.00 | 36.90 | 33.00 | 28.43 | 21.81 | 26.97 | 24.83 |
| Kentucky | 103.00 | 105.00 | 95.00 | 72.17 | 51.66 | 64.16 | 56.02 | 36.50 | 32.70 | 30.75 | 26.72 | 21.29 | 27.40 | 27.16 |
| Tennessee | 114.00 | 112.00 | 103.00 | 74.56 | 52.16 | 63.63 | 62.84 | 31.00 | 27.50 | 24.00 | 22.82 | 17.00 | 20.15 | 19.13 |
| Alabama | 104.00 | 95.00 | 88.00 | 69.99 | 54.76 | 69.55 | 70.28 | 25.00 | 23.00 | 22.00 | 19.87 | 13.42 | 15.36 | 17.46 |
| Mississippi | 92.00 | 85.00 | 78.00 | 62.02 | 49.51 | 70.43 | 74.94 | 27.00 | 23.50 | 20.00 | 21.28 | 14.36 | 15.55 | 19.16 |
| Louisiana | 83.00 | 79.00 | 65.00 | 53.73 | 41.60 | 56.63 | 69.26 | 29.50 | 24.30 | 23.50 | 23.70 | 16.33 | 17.95 | 20.45 |
| Texas | 80.00 | 73.00 | 71.00 | 42.72 | 24.79 | 33.41 | 29.40 | 34.00 | 29.50 | 27.00 | 23.58 | 16.34 | 18.13 | 12.73 |
| Oklahoma | 86.00 | 81.00 | 73.00 | 50.55 | 21.34 | ...... | ...... | 37.00 | 31.50 | 26.25 | 25.69 | 21.53 | ...... | ...... |
| Arkansas | 92.00 | 82.00 | 72.00 | 55.24 | 41.43 | 56.09 | 57.77 | 27.50 | 22.00 | 19.25 | 18.65 | 13.43 | 17.19 | 16.68 |
| Montana | 87.00 | 80.00 | 65.00 | 41.85 | 28.64 | 54.74 | ...... | 48.50 | 46.50 | 44.00 | 37.43 | 28.46 | 36.02 | ...... |
| Wyoming | 79.00 | 83.00 | 65.00 | 37.99 | 24.96 | 48.61 | ...... | 45.00 | 43.70 | 40.00 | 37.48 | 29.28 | 33.53 | ...... |
| Colorado | 89.00 | 85.00 | 72.00 | 48.63 | 34.51 | 60.15 | ...... | 44.50 | 41.00 | 35.50 | 34.04 | 27.47 | 38.57 | ...... |
| New Mexico | 50.00 | 47.00 | 41.00 | 28.19 | 20.93 | 38.19 | ...... | 42.50 | 38.80 | 36.50 | 33.83 | 22.19 | 26.92 | ...... |
| Arizona | 59.00 | 62.00 | 53.00 | 32.46 | 30.89 | 52.36 | ...... | 48.50 | 43.00 | 45.00 | 37.07 | 23.69 | 28.72 | ...... |
| Utah | 87.00 | 85.00 | 72.00 | 43.55 | 24.32 | 43.75 | ...... | 39.00 | 34.00 | 31.50 | 31.51 | 20.16 | 29.93 | ...... |
| Nevada | 84.00 | 78.00 | 70.00 | 47.88 | 29.50 | 57.42 | ...... | 48.00 | 44.00 | 40.25 | 37.89 | 27.02 | 36.99 | ...... |
| Idaho | 104.00 | 102.00 | 82.00 | 47.62 | 29.78 | 55.00 | ...... | 43.50 | 41.40 | 35.50 | 32.90 | 24.97 | 34.93 | ...... |
| Washington | 108.00 | 108.00 | 101.00 | 68.47 | 42.94 | 64.70 | ...... | 45.00 | 41.80 | 40.00 | 35.98 | 29.61 | 33.45 | ...... |
| Oregon | 111.00 | 103.00 | 92.00 | 59.38 | 32.02 | 54.62 | 47.54 | 42.00 | 39.60 | 36.00 | 32.53 | 23.35 | 27.30 | 26.16 |
| California | 117.00 | 105.00 | 90.00 | 69.07 | 43.60 | 58.50 | 43.34 | 48.00 | 38.40 | 36.00 | 36.81 | 26.65 | 34.20 | 36.58 |
| United States | 111.67 | 108.19 | 95.64 | 71.99 | 48.24 | 67.78 | 62.07 | 40.49 | 35.79 | 32.36 | 30.12 | 23.35 | 26.65 | 27.27 |

| State or Territory. | Other Cattle. | | | | | | | Sheep. | | | | | | | Swine. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1911. | 1910. | 1909. | 1900–1909. | 1890–1899. | 1880–1889. | 1870–1879. | 1911. | 1910. | 1909. | 1900–1909. | 1890–1899. | 1880–1889. | 1870–1879. | 1911. | 1910. | 1909. | 1900–1909. | 1890–1899. | 1880–1889. | 1870–1879 |
| Maine | $21.20 | $16.90 | $15.00 | $17.37 | $23.58 | $27.85 | $29.48 | $4.00 | $3.70 | $3.10 | $3.31 | $2.58 | $2.89 | $2.99 | $13.10 | $11.50 | $8.50 | $9.22 | $8.28 | $9.47 | $9.42 |
| New Hampshire | 24.90 | 20.30 | 18.00 | 17.88 | 23.67 | 30.35 | 31.83 | 4.30 | 3.70 | 3.30 | 3.28 | 2.65 | 2.87 | 2.73 | 11.70 | 11.50 | 9.50 | 9.65 | 8.75 | 10.96 | 12.64 |
| Vermont | 20.00 | 14.40 | 13.50 | 14.88 | 21.44 | 26.87 | 28.19 | 4.60 | 4.00 | 3.60 | 3.56 | 2.76 | 3.37 | 3.12 | 10.80 | 10.00 | 8.25 | 8.64 | 8.26 | 8.87 | 10.00 |
| Massachusetts | 19.90 | 16.70 | 16.00 | 17.72 | 25.62 | 32.30 | 38.64 | 5.20 | 4.20 | 4.00 | 4.30 | 3.68 | 3.31 | 3.21 | 12.20 | 11.50 | 9.25 | 10.22 | 9.37 | 12.31 | 13.27 |
| Rhode Island | 19.60 | 17.50 | 18.00 | 19.57 | 26.54 | 33.43 | 42.80 | 4.60 | 4.20 | 4.00 | 3.99 | 3.55 | 3.71 | 3.70 | 12.50 | 12.50 | 10.00 | 10.51 | 9.08 | 10.52 | 12.31 |
| Connecticut | 21.90 | 19.10 | 17.50 | 20.15 | 28.24 | 32.01 | 37.60 | 5.60 | 4.70 | 4.40 | 4.40 | 3.57 | 3.65 | 3.64 | 13.00 | 12.50 | 11.00 | 11.11 | 9.82 | 10.16 | 12.64 |
| New York | 22.20 | 18.20 | 16.50 | 17.84 | 25.51 | 31.44 | 30.49 | 5.10 | 5.00 | 4.30 | 4.28 | 3.34 | 3.49 | 3.26 | 11.60 | 11.50 | 8.50 | 8.86 | 7.38 | 8.70 | 8.34 |
| New Jersey | 23.70 | 21.40 | 20.50 | 21.30 | 26.88 | 33.03 | 33.89 | 5.30 | 5.20 | 5.00 | 4.54 | 3.88 | 3.99 | 4.35 | 13.00 | 12.00 | 9.25 | 10.30 | 8.67 | 9.76 | 10.12 |
| Pennsylvania | 21.40 | 19.20 | 18.50 | 18.87 | 22.44 | 27.00 | 27.03 | 4.70 | 4.80 | 4.50 | 4.00 | 3.17 | 3.09 | 2.98 | 11.50 | 9.50 | 8.50 | 8.51 | 7.42 | 8.30 | 8.07 |
| Delaware | 22.30 | 21.00 | 19.50 | 19.67 | 21.22 | 27.26 | 22.18 | 4.30 | 4.60 | 4.40 | 3.97 | 3.34 | 3.22 | 3.50 | 9.50 | 8.70 | 8.00 | 7.99 | 5.89 | 7.29 | 6.40 |
| Maryland | 22.00 | 21.10 | 20.00 | 19.33 | 21.29 | 23.73 | 21.26 | 4.80 | 4.70 | 4.60 | 3.95 | 3.26 | 3.30 | 3.54 | 8.80 | 8.90 | 6.60 | 7.21 | 6.22 | 6.49 | 5.76 |
| Virginia | 20.40 | 19.40 | 18.50 | 18.54 | 16.79 | 18.33 | 15.67 | 4.00 | 3.90 | 3.80 | 3.32 | 2.59 | 2.48 | 2.46 | 7.50 | 6.50 | 5.50 | 4.99 | 3.79 | 4.23 | 3.77 |
| West Virginia | 23.80 | 22.50 | 21.50 | 21.18 | 17.91 | 20.83 | 21.54 | 4.20 | 4.30 | 4.00 | 3.46 | 2.51 | 2.32 | 2.12 | 7.50 | 7.70 | 6.00 | 5.75 | 4.18 | 4.33 | 3.82 |
| North Carolina | 13.40 | 12.50 | 11.50 | 10.91 | 10.55 | 10.34 | 8.98 | 2.90 | 2.60 | 2.40 | 2.10 | 1.52 | 1.35 | 1.41 | 7.60 | 7.20 | 6.30 | 4.82 | 3.58 | 3.64 | 3.28 |
| South Carolina | 13.00 | 12.00 | 11.50 | 10.76 | 11.20 | 11.26 | 10.69 | 2.80 | 2.40 | 2.20 | 2.06 | 1.68 | 1.71 | 1.70 | 8.30 | 7.20 | 6.25 | 5.14 | 4.14 | 3.84 | 3.64 |
| Georgia | 11.60 | 10.30 | 9.50 | 10.09 | 9.34 | 10.12 | 8.88 | 2.20 | 2.20 | 1.90 | 1.89 | 1.58 | 1.48 | 1.47 | 7.40 | 7.00 | 5.50 | 5.02 | 3.52 | 3.42 | 3.17 |
| Florida | 12.40 | 10.30 | 10.00 | 9.37 | 8.13 | 8.40 | 7.40 | 2.10 | 2.00 | 1.90 | 1.98 | 1.29 | 1.79 | 1.71 | 4.60 | 4.80 | 4.00 | 3.08 | 2.23 | 2.37 | 2.45 |
| Ohio | 24.80 | 24.10 | 22.00 | 22.16 | 22.93 | 26.76 | 24.78 | 4.20 | 4.80 | 4.10 | 3.78 | 2.81 | 2.75 | 2.41 | 9.30 | 10.70 | 6.75 | 7.11 | 5.37 | 6.06 | 5.83 |
| Indiana | 25.70 | 24.50 | 21.50 | 22.47 | 21.22 | 23.52 | 19.39 | 4.90 | 5.20 | 4.50 | 4.15 | 3.10 | 2.56 | 2.11 | 9.30 | 10.00 | 6.10 | 6.75 | 5.53 | 5.90 | 4.96 |
| Illinois | 26.30 | 26.40 | 23.00 | 24.15 | 21.46 | 24.84 | 20.66 | 5.00 | 5.30 | 4.80 | 4.33 | 3.03 | 2.61 | 2.20 | 10.40 | 10.90 | 7.00 | 7.44 | 5.88 | 6.22 | 5.61 |
| Michigan | 19.90 | 18.50 | 16.00 | 17.56 | 20.58 | 25.94 | 24.39 | 4.50 | 4.70 | 3.90 | 3.78 | 2.87 | 2.79 | 2.34 | 10.50 | 10.50 | 7.00 | 7.42 | 5.81 | 6.34 | 5.56 |
| Wisconsin | 17.50 | 16.40 | 15.00 | 15.79 | 18.28 | 22.59 | 20.50 | 4.30 | 4.50 | 3.80 | 3.54 | 2.64 | 2.31 | 2.24 | 11.00 | 11.80 | 8.25 | 7.96 | 6.29 | 6.35 | 5.26 |
| Minnesota | 15.00 | 14.30 | 12.50 | 13.74 | 16.53 | 21.80 | 19.02 | 3.80 | 4.00 | 3.50 | 3.30 | 2.47 | 2.44 | 2.26 | 11.10 | 11.50 | 7.75 | 7.81 | 5.95 | 5.78 | 5.05 |
| Iowa | 24.10 | 22.20 | 22.50 | 23.43 | 21.83 | 22.85 | 19.36 | 5.00 | 5.30 | 4.60 | 4.19 | 3.04 | 2.59 | 2.02 | 11.60 | 11.30 | 8.00 | 7.78 | 6.34 | 6.29 | 5.43 |
| Missouri | 24.00 | 22.60 | 21.00 | 20.68 | 18.43 | 19.68 | 16.55 | 4.20 | 4.40 | 3.90 | 3.49 | 2.29 | 1.85 | 1.63 | 8.60 | 7.90 | 5.25 | 5.47 | 4.17 | 4.17 | 3.61 |
| North Dakota | 19.10 | 20.50 | 17.50 | 19.65 | 18.90 | ...... | ...... | 3.80 | 4.00 | 3.60 | 3.21 | 2.50 | ...... | ...... | 10.40 | 11.00 | 8.00 | 7.94 | 5.81 | ...... | ...... |
| South Dakota | 21.80 | 21.50 | 18.50 | 20.29 | 18.36 | a23.90 | ...... | 3.80 | 4.00 | 3.50 | 3.27 | 2.60 | a2.5[illegible] | ...... | 11.00 | 11.10 | 7.90 | 7.72 | 5.81 | a6.41 | ...... |
| Nebraska | 22.50 | 21.90 | 20.00 | 20.81 | 18.90 | 23.31 | 21.60 | 4.10 | 4.40 | 3.50 | 3.34 | 2.45 | 2.28 | 2.31 | 10.90 | 11.00 | 7.25 | 7.20 | 5.45 | 6.21 | 5.43 |
| Kansas | 25.30 | 23.70 | 21.50 | 21.64 | 19.43 | 22.48 | 18.67 | 4.20 | 4.70 | 4.00 | 3.45 | 2.18 | 2.09 | 2.16 | 9.90 | 10.00 | 6.50 | 6.86 | 5.43 | 6.07 | 5.56 |
| Kentucky | 20.90 | 19.90 | 18.50 | 18.39 | 17.85 | 22.76 | 21.56 | 3.90 | 4.00 | 3.80 | 3.25 | 2.56 | 2.57 | 2.44 | 7.20 | 6.80 | 4.75 | 4.75 | 3.95 | 4.33 | 3.98 |

a Dakota Territory.

*Acreage, Production, and Value of Important Farm Crops of the United States in* 1910.

| STATE OR TERRITORY. | CORN. | | | | |
|---|---|---|---|---|---|
| | Acreage. | Yield per acre. | Production. | Price per bush. Dec. 1. | Total farm value Dec. 1. |
| | *Acres.* | *Bu.* | *Bushels.* | *Cts.* | *Dollars.* |
| Maine | 17,000 | 46.0 | 782,000 | 71 | 555,000 |
| New Hampshire | 31,000 | 46.0 | 1,426,000 | 69 | 984,000 |
| Vermont | 67,000 | 43.0 | 2,881,000 | 66 | 1,901,000 |
| Massachusetts | 50,000 | 45.5 | 2,275,000 | 70 | 1,592,000 |
| Rhode Island | 11,000 | 40.0 | 440,000 | 83 | 365,000 |
| Connecticut | 63,000 | 53.2 | 3,352,000 | 68 | 2,279,000 |
| New York | 680,000 | 38.3 | 26,044,000 | 63 | 16,408,000 |
| New Jersey | 290,000 | 36.0 | 10,440,000 | 60 | 6,264,000 |
| Pennsylvania | 1,586,000 | 41.0 | 65,026,000 | 59 | 38,365,000 |
| Delaware | 202,000 | 31.8 | 6,424,000 | 52 | 3,340,000 |
| Maryland | 710,000 | 33.5 | 23,785,000 | 58 | 13,795,000 |
| Virginia | 2,142,000 | 25.5 | 54,621,000 | 65 | 35,504,000 |
| West Virginia | 920,000 | 26.0 | 23,920,000 | 68 | 16,266,000 |
| North Carolina | 3,072,000 | 18.6 | 57,139,000 | 76 | 43,426,000 |
| South Carolina | 2,418,000 | 18.5 | 44,733,000 | 82 | 36,681,000 |
| Georgia | 4,532,000 | 14.5 | 65,714,000 | 78 | 51,257,000 |
| Florida | 678,000 | 13.0 | 8,814,000 | 85 | 7,492,000 |
| Ohio | 3,960,000 | 36.5 | 144,540,000 | 46 | 66,488,000 |
| Indiana | 5,120,000 | 39.3 | 201,216,000 | 40 | 80,486,000 |
| Illinois | 10,609,000 | 39.1 | 414,812,000 | 38 | 157,629,000 |
| Michigan | 2,100,000 | 32.4 | 68,040,000 | 53 | 36,061,000 |
| Wisconsin | 1,575,000 | 32.5 | 51,188,000 | 52 | 26,618,000 |
| Minnesota | 1,724,000 | 32.7 | 56,375,000 | 45 | 25,369,000 |
| Iowa | 9,473,000 | 36.3 | 343,870,000 | 36 | 123,793,000 |
| Missouri | 8,300,000 | 33.0 | 273,900,000 | 44 | 120,516,000 |
| North Dakota | 214,000 | 14.0 | 2,996,000 | 58 | 1,738,000 |
| South Dakota | 2,162,000 | 25.0 | 54,050,000 | 40 | 21,620,000 |
| Nebraska | 8,000,000 | 25.8 | 206,400,000 | 36 | 74,304,000 |
| Kansas | 8,900,000 | 19.0 | 169,100,000 | 45 | 76,095,000 |
| Kentucky | 3,630,000 | 29.0 | 105,270,000 | 53 | 55,793,000 |
| Tennessee | 3,720,000 | 25.9 | 96,348,000 | 56 | 53,955,000 |
| Alabama | 3,524,000 | 18.0 | 63,432,000 | 71 | 45,037,000 |
| Mississippi | 3,232,000 | 20.5 | 66,256,000 | 63 | 41,741,000 |
| Louisiana | 2,493,000 | 23.6 | 58,835,000 | 55 | 32,359,000 |
| Texas | 8,800,000 | 20.6 | 181,280,000 | 63 | 114,206,000 |
| Oklahoma | 5,772,000 | 16.0 | 92,352,000 | 51 | 47,100,000 |
| Arkansas | 2,884,000 | 24.0 | 69,216,000 | 58 | 40,145,000 |
| Montana | 8,000 | 23.0 | 184,000 | 95 | 175,000 |
| Wyoming | 6,000 | 10.0 | 60,000 | 66 | 40,000 |
| Colorado | 143,000 | 19.9 | 2,846,000 | 60 | 1,708,000 |
| New Mexico | 70,000 | 23.0 | 1,610,000 | 90 | 1,449,000 |
| Arizona | 12,000 | 32.5 | 390,000 | 110 | 429,000 |
| Utah | 13,000 | 30.3 | 394,000 | 84 | 331,000 |
| Nevada | ........ | ..... | ........ | .... | ........ |
| Idaho | 6,000 | 32.0 | 192,000 | 71 | 136,000 |
| Washington | 16,000 | 28.0 | 448,000 | 75 | 336,000 |
| Oregon | 18,000 | 25.5 | 459,000 | 80 | 367,000 |
| California | 49,000 | 37.5 | 1,838,000 | 80 | 1,470,000 |
| United States | 114,002,000 | 27.4 | 3,125,713,000 | 48.8 | 1,523,968,000 |

## *Acreage, Production, and Value of Important Farm Crops in the United States in* 1910.—Continued.

| State or Territory. | Oats. | | | | |
|---|---|---|---|---|---|
| | Acreage. | Yield per acre. | Production. | Price per bush. Dec. 1. | Total farm value Dec. 1. |
| | *Acres.* | *Bu.* | *Bushels.* | *Cts.* | *Dollars.* |
| Maine | 131,000 | 42.4 | 5,554,000 | 48 | 2,666,000 |
| New Hampshire | 14,000 | 42.8 | 599,000 | 51 | 305,000 |
| Vermont | 85,000 | 41.5 | 3,528,000 | 50 | 1,764,000 |
| Massachusetts | 7,000 | 35.5 | 248,000 | 50 | 124,000 |
| Rhode Island | 2,000 | 35.0 | 70,000 | 48 | 34,000 |
| Connecticut | 11,000 | 36.8 | 405,000 | 44 | 178,000 |
| New York | 1,338,000 | 34.5 | 46,161,000 | 42 | 19,388,000 |
| New Jersey | 60,000 | 37.1 | 2,226,000 | 44 | 979,000 |
| Pennsylvania | 998,000 | 35.2 | 35,130,000 | 41 | 14,403,000 |
| Delaware | 4,000 | 33.8 | 135,000 | 43 | 58,000 |
| Maryland | 27,000 | 30.0 | 810,000 | 46 | 373,000 |
| Virginia | 194,000 | 22.0 | 4,268,000 | 49 | 2,091,000 |
| West Virginia | 100,000 | 25.2 | 2,520,000 | 50 | 1,260,000 |
| North Carolina | 190,000 | 18.2 | 3.458,000 | 60 | 2,075,000 |
| South Carolina | 219,000 | 21.0 | 4,599,000 | 65 | 2,989,000 |
| Georgia | 343,000 | 18.2 | 6,243,000 | 64 | 3,996,000 |
| Florida | 31,000 | 16.2 | 502,000 | 65 | 326,000 |
| Ohio | 1,765,000 | 37.2 | 65,658,000 | 35 | 22,980,000 |
| Indiana | 1,850,000 | 35.4 | 65,490,000 | 31 | 20,302,000 |
| Illinois | 4,500,000 | 38.0 | 171,000,000 | 30 | 51,300,000 |
| Michigan | 1,505,000 | 34.0 | 51,170,000 | 35 | 17,910,000 |
| Wisconsin | 2,320,000 | 29.8 | 69,136,000 | 34 | 23,506,000 |
| Minnesota | 2,736,000 | 28.7 | 78,523,000 | 32 | 25,127,000 |
| Iowa | 4,800,000 | 37.8 | 181,440,000 | 27 | 48,989,000 |
| Missouri | 780,000 | 33.6 | 26,208,000 | 32 | 8,387,000 |
| North Dakota | 1,628,000 | 7.0 | 11,396,000 | 37 | 4,217,000 |
| South Dakota | 1,525,000 | 23.0 | 35,075,000 | 30 | 10,522,000 |
| Nebraska | 2,650,000 | 28.0 | 74,200,000 | 28 | 20,776,000 |
| Kansas | 1,400,000 | 33.3 | 46,620,000 | 34 | 15,851,000 |
| Kentucky | 170,000 | 25.0 | 4,250,000 | 45 | 1,912,000 |
| Tennessee | 200,000 | 23.0 | 4,600,000 | 46 | 2,116,000 |
| Alabama | 297,000 | 18.5 | 5,494,000 | 60 | 3,296,000 |
| Mississippi | 175,000 | 19.2 | 3,360,000 | 55 | 1,848,000 |
| Louisiana | 36,000 | 21.5 | 774,000 | 49 | 379,000 |
| Texas | 695,000 | 35.0 | 24,325,000 | 47 | 11,433,000 |
| Oklahoma | 632,000 | 36.5 | 23,068,000 | 37 | 8,535,000 |
| Arkansas | 172,000 | 27.5 | 4,730,000 | 46 | 2,176,000 |
| Montana | 350,000 | 38.0 | 13,300,000 | 46 | 6,118,000 |
| Wyoming | 130,000 | 32.0 | 4,160,000 | 50 | 2,080,000 |
| Colorado | 202,000 | 39.1 | 7,898,000 | 46 | 3,633,000 |
| New Mexico | 30,000 | 27.4 | 822,000 | 62 | 510,000 |
| Arizona | 4,000 | 40.1 | 160,000 | 90 | 144,000 |
| Utah | 58,000 | 43.0 | 2,494,000 | 48 | 1,197,000 |
| Nevada | 7,000 | 44.7 | 313,000 | 63 | 197,000 |
| Idaho | 184,000 | 38.5 | 7,084,000 | 42 | 2,975,000 |
| Washington | 206,000 | 42.8 | 8,817,000 | 48 | 4,232,000 |
| Oregon | 302,000 | 34.5 | 10,419,000 | 47 | 4,897,000 |
| California | 225,000 | 37.0 | 8,325,000 | 50 | 4,162,000 |
| United States | 35,288,000 | 31.9 | 1,126,765,000 | 34.1 | 384,716,000 |

## *Acreage, Production, and Value of Important Farm Crops of the United States in* 1910.—Continued.

| State or Territory. | Potatoes. | | | | |
|---|---|---|---|---|---|
| | Acreage. | Yield per acre. | Production. | Price per bush. Dec. 1. | Total farm value Dec. 1. |
| | *Acres.* | *Bu.* | *Bushels.* | *Cts.* | *Dollars.* |
| Maine | 127,000 | 220 | 27,940,000 | 42 | 11,735,000 |
| New Hampshire | 21,000 | 150 | 3,150,000 | 52 | 1,638,000 |
| Vermont | 29,000 | 130 | 3,770,000 | 45 | 1,696,000 |
| Massachusetts | 35,000 | 125 | 4,375,000 | 70 | 3,062,000 |
| Rhode Island | 6,000 | 136 | 816,000 | 69 | 563,000 |
| Connecticut | 35,000 | 125 | 4,375,000 | 70 | 3,062,000 |
| New York | 438,000 | 102 | 44,676,000 | 48 | 21,444,000 |
| New Jersey | 95,000 | 105 | 9,975,000 | 65 | 6,484,000 |
| Pennsylvania | 320,000 | 88 | 28,160,000 | 52 | 14,643,000 |
| Delaware | 10,000 | 103 | 1,030,000 | 60 | 618,000 |
| Maryland | 36,000 | 95 | 3,420,000 | 54 | 1,847,000 |
| Virginia | 67,000 | 98 | 6,566,000 | 58 | 3,808,000 |
| West Virginia | 41,000 | 92 | 3,772,000 | 67 | 2,527,000 |
| North Carolina | 26,000 | 89 | 2,314,000 | 73 | 1,689,000 |
| South Carolina | 10,000 | 90 | 900,000 | 105 | 945,000 |
| Georgia | 10,000 | 82 | 820,000 | 105 | 861,000 |
| Florida | 6,000 | 90 | 540,000 | 100 | 540,000 |
| Ohio | 182,000 | 82 | 14,924,000 | 51 | 7,611,000 |
| Indiana | 92,000 | 84 | 7,728,000 | 50 | 3,864,000 |
| Illinois | 169,000 | 75 | 12,675,000 | 59 | 7,478,000 |
| Michigan | 335,000 | 105 | 35,175,000 | 31 | 10,904,000 |
| Wisconsin | 260,000 | 95 | 24,700,000 | 38 | 9,386,000 |
| Minnesota | 165,000 | 61 | 10,065,000 | 64 | 6,442,000 |
| Iowa | 170,000 | 72 | 12,240,000 | 60 | 7,344,000 |
| Missouri | 92,000 | 86 | 7,912,000 | 68 | 5,380,000 |
| North Dakota | 35,000 | 41 | 1,435,000 | 91 | 1,306,000 |
| South Dakota | 55,000 | 44 | 2,420,000 | 85 | 2,057,000 |
| Nebraska | 110,000 | 60 | 6,600,000 | 84 | 5,544,000 |
| Kansas | 88,000 | 57 | 5,016,000 | 90 | 4,514,000 |
| Kentucky | 41,000 | 92 | 3,772,000 | 62 | 2,339,000 |
| Tennessee | 30,000 | 80 | 2,400,000 | 65 | 1,560,000 |
| Alabama | 18,000 | 80 | 1,440,000 | 94 | 1,354,000 |
| Mississippi | 9,000 | 85 | 765,000 | 94 | 719,000 |
| Louisiana | 20,000 | 55 | 1,100,000 | 90 | 990,000 |
| Texas | 60,000 | 51 | 3,060,000 | 110 | 3,366,000 |
| Oklahoma | 26,000 | 60 | 1,560,000 | 100 | 1,560,000 |
| Arkansas | 31,000 | 84 | 2,604,000 | 85 | 2,213,000 |
| Montana | 25,000 | 120 | 3,000,000 | 85 | 2,550,000 |
| Wyoming | 11,000 | 100 | 1,100,000 | 82 | 902,000 |
| Colorado | 65,000 | 100 | 6,500,000 | 55 | 3,575,000 |
| New Mexico | 2,000 | 47 | 94,000 | 104 | 98,000 |
| Arizona | | | | | |
| Utah | 15,000 | 142 | 2,130,000 | 59 | 1,257,000 |
| Nevada | 4,000 | 150 | 600,000 | 80 | 480,000 |
| Idaho | 24,000 | 142 | 3,408,000 | 65 | 2,215,000 |
| Washington | 39,000 | 131 | 5,109,000 | 73 | 3,730,000 |
| Oregon | 44,000 | 105 | 4,620,000 | 70 | 3,234,000 |
| California | 62,000 | 130 | 8,060,000 | 85 | 6,851,000 |
| United States | 3,591,000 | 94.4 | 338,811,000 | 55.5 | 187,985,000 |

*Acreage, Production, and Value of Important Farm Crops of the United States in* 1910.—Concluded.

| State or Territory. | Hay. | | | | |
|---|---|---|---|---|---|
| | Acreage. | Yield per acre. | Production. | Price per ton Dec. 1. | Total farm value Dec. 1. |
| | *Acres.* | *Tons.* | *Tons.* | *Dolls.* | *Dollars.* |
| Maine | 1,400,000 | 1.25 | 1,750,000 | 12.80 | 22,400,000 |
| New Hampshire | 640,000 | 1.20 | 768,000 | 15.80 | 12,134,000 |
| Vermont | 930,000 | 1.35 | 1,256,000 | 12.40 | 15,574,000 |
| Massachusetts | 590,000 | 1.28 | 755,000 | 19.10 | 14,420,000 |
| Rhode Island | 63,000 | 1.18 | 74,000 | 19.60 | 1,450,000 |
| Connecticut | 490,000 | 1.35 | 662,000 | 19.00 | 12,578,000 |
| New York | 4,811,000 | 1.32 | 6,351,000 | 13.70 | 87,009,000 |
| New Jersey | 437,000 | 1.50 | 656,000 | 18.20 | 11,939,000 |
| Pennsylvania | 3,212,000 | 1.38 | 4,433,000 | 15.00 | 66,495,000 |
| Delaware | 77,000 | 1.43 | 110,000 | 14.80 | 1,628,000 |
| Maryland | 291,000 | 1.35 | 393,000 | 15.40 | 6,052,000 |
| Virginia | 475,000 | 1.19 | 565,000 | 14.50 | 8,092,000 |
| West Virginia | 675,000 | 1.20 | 810,000 | 15.00 | 12,150,000 |
| North Carolina | 175,000 | 1.50 | 262,000 | 14.60 | 3,825,000 |
| South Carolina | 67,000 | 1.25 | 84,000 | 16.00 | 1,344,000 |
| Georgia | 87,000 | 1.40 | 122,000 | 16.40 | 2,001,000 |
| Florida | 19,000 | 1.33 | 25,000 | 17.00 | 425,000 |
| Ohio | 2,840,000 | 1.39 | 3,948,000 | 12.50 | 49,350,000 |
| Indiana | 2,100,000 | 1.30 | 2,730,000 | 11.90 | 32,487,000 |
| Illinois | 2,795,000 | 1.33 | 3,717,000 | 12.00 | 44,604,000 |
| Michigan | 2,592,000 | 1.30 | 3,370,000 | 13.60 | 45,832,000 |
| Wisconsin | 2,260,000 | 1.00 | 2,260,000 | 15.10 | 34,126,000 |
| Minnesota | 908,000 | 1.00 | 908,000 | 9.10 | 8,263,000 |
| Iowa | 3,600,000 | 1.05 | 3,780,000 | 9.60 | 36,288,000 |
| Missouri | 2,700,000 | 1.30 | 3,510,000 | 9.20 | 32,292,000 |
| North Dakota | 188,000 | .55 | 103,000 | 7.60 | 783,000 |
| South Dakota | 510,000 | .80 | 408,000 | 7.10 | 2,897,000 |
| Nebraska | 1,500,000 | 1.00 | 1,500,000 | 8.90 | 13,350,000 |
| Kansas | 1,792,000 | 1.15 | 2,061,000 | 7.80 | 16,076,000 |
| Kentucky | 500,000 | 1.29 | 645,000 | 13.10 | 8,450,000 |
| Tennessee | 455,000 | 1.40 | 637,000 | 13.40 | 8,536,000 |
| Alabama | 120,000 | 1.43 | 172,000 | 13.20 | 2,270,000 |
| Mississippi | 100,000 | 1.42 | 142,000 | 12.20 | 1,732,000 |
| Louisiana | 25,000 | 1.75 | 44,000 | 11.50 | 506,000 |
| Texas | 618,000 | 1.15 | 711,000 | 12.00 | 8,532,000 |
| Oklahoma | 900,000 | 1.05 | 945,000 | 8.40 | 7,938,000 |
| Arkansas | 210,000 | 1.35 | 284,000 | 11.00 | 3,124,000 |
| Montana | 600,000 | 1.40 | 840,000 | 12.50 | 10,500,000 |
| Wyoming | 300,000 | 2.40 | 720,000 | 12.50 | 9,000,000 |
| Colorado | 700,000 | 2.00 | 1,400,000 | 10.80 | 15,120,000 |
| New Mexico | 194,000 | 2.10 | 407,000 | 11.50 | 4,680,000 |
| Arizona | 116,000 | 2.10 | 244,000 | 13.00 | 3,172,000 |
| Utah | 380,000 | 3.00 | 1,140,000 | 9.00 | 10,260,000 |
| Nevada | 231,000 | 3.40 | 785,000 | 10.80 | 8,478,000 |
| Idaho | 491,000 | 3.00 | 1,473,000 | 9.00 | 13,257,000 |
| Washington | 388,000 | 2.10 | 815,000 | 15.70 | 12,796,000 |
| Oregon | 439,000 | 2.10 | 922,000 | 12.10 | 11,156,000 |
| California | 700,000 | 1.83 | 1,281,000 | 9.60 | 12,298,000 |
| United States | 45,691,000 | 1.33 | 60,978,000 | 12.26 | 747,769,000 |

## GRANGE DIRECTORY.

### OFFICERS OF THE NATIONAL GRANGE.

*Master.*—N. J. Bachelder.................................Concord, N. H.  
*Lecturer.*—Oliver Wilson....................................Peoria, Ill.  
*Treasurer.*—Mrs. E. S. McDowell..........6 Norfolk Terrace, Wellesley, Mass.  
*Secretary.*—C. M. Freeman...........................Tippecanoe City, Ohio.

### OFFICERS OF THE R. I. STATE GRANGE.

*Master.*—Frank E. Marchant.............................West Kingston.  
*Lecturer.*—Charles R. Magoon..........................East Greenwich.  
*Treasurer.*—Benjamin Martin...........................East Providence.  
*Secretary.*—Mrs. Clara L. Chase.........................Box 400, Newport.

#### EXECUTIVE COMMITTEE.

R. M. Bowen...............................86 Weybosset St., Providence.  
Daniel S. Bushee..................................................Warren.  
H. S. Turner.......................................Johnston, R. F. D.  
F. E. Marchant, *ex-officio*..................................................  
Mrs. Clara L. Chase, *ex-officio*.............................................

#### DEPUTIES.

*General Deputy.*—Richard M. Bowen............86 Weybosset St., Providence.  
*Providence County.*—Amos F. Maker...........North Swansea, Mass., R. F. D.  
*Newport County.*—George Howland..............................Jamestown.  
*Kent County.*—William B. Babcock................East Greenwich, R. F. D.  
*Washington County.*—Mrs. L. Alice James.......................Hope Valley.

## POMONA GRANGE OFFICERS.

### Providence County, No. 1.

*Master.*—Walter S. Nichol .......... Barrington.
*Lecturer.*—Mrs. Mary Arno .......... Barrington.
*Secretary.*—Miss Jennie E. Weatherhead .......... Ashton.

### Washington County, No. 2.

*Master.*—Charles F. Bentley .......... East Greenwich.
*Lecturer.*—George E. Adams .......... Kingston.
*Secretary.*—A. D. Miner .......... East Greenwich.

### Kent County, No. 3.

*Master.*—Richard M. Bowen .......... 86 Weybosset St., Providence.
*Lecturer.*—Miss Louisa M. Bowen .......... Buttonwoods.
*Secretary.*—Mrs. Abbie Groves .......... Hope.

Meets second Thursday of January, March, May, July, September, November by appointment.

### Newport County, No. 4.

*Master.*—George Howland .......... Jamestown.
*Lecturer.*—Mrs. William Hughes .......... Melville Branch, Newport.
*Secretary.*—William J. O. Young .......... Newport.

Meets third Tuesday of each alternate month at the local granges.

## SUBORDINATE GRANGE OFFICERS.

### Narragansett, No. 1.

*Master.*—Mrs. Emily B. Gardner ..........
*Lecturer.*—E. Collins Tefft .......... Wakefield.
*Secretary.*—Mrs. Lillian E. Holley .......... Peace Dale.

Meets fourth Tuesday of each month at Wakefield.

### Cumberland, No. 2.

*Master.*—Eugene F. Crowingshield .......... Abbots Run.
*Lecturer.*—Mrs. Jennie Wood .......... Grant's Mills.
*Secretary.*—Mrs. Annie L. Jenckes ..... North Attleboro, Mass., R. F. D. Box 15.

Meets first and third Thursdays of each month at Grange Hall, Arnold's Mills.

### Border, No. 3.

*Master.*—Clarence Crooks .................... Woonsocket.
*Lecturer.*—Carrie Smith Beauregard .................... Woonsocket.
*Secretary.*—Hazel Beauregard .................... Woonsocket.

Meets second and fourth Thursdays of each month at Border Grange Hall, East Woonsocket.

### Burrillville, No. 4.

*Master.*—E. B. Sherman .................... Harrisville.
*Lecturer.*— ....................
*Secretary.*—Miss Elizabeth Thayer .................... Harrisville.

### Hope Valley, No. 7.

*Master.*—Elmer A. Smith .................... Wyoming.
*Lecturer.*—Mrs. Jane F. Nye .................... Hope Valley.
*Secretary.*—Miss Nellie Lewis .................... Hope Valley.

Meets on the first and third Saturdays of each month at Grange Hall, Hope Valley.

### Primrose, No. 9.

*Master.*—Daniel M. Mowry .................... Woonsocket.
*Lecturer.*—Ruth A. Mowry .................... Smithfield.
*Secretary.*—Mrs. David C. Todd .................... Woonsocket.

Meets on the second and fourth Tuesday of each month at Woinkheige Hall.

### West Kingston, No. 10.

*Master.*—E. A. Mallette .................... Kingston.
*Lecturer.*—J. Raleigh Eldred .................... Kingston.
*Secretary.*—Miss Jessie Barlow .................... Kingston.

Meets on the second and fourth Saturdays of each month at Lippitt Hall, Kingston.

### Exeter, No. 12.

*Master.*—Mrs. Martha A. Gardner .................... Slocum.
*Lecturer.*—Mrs. Lena V. Dutemple .................... Exeter.
*Secretary.*—Mrs. Minnie T. Knight .................... Liberty.

Meets on the first and third Thursdays of each month at Odd Fellows' Hall, Chestnut Hill, Exeter.

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### UNION, NO. 13.

*Master.*—Warren W. Aldrich........................Woonsocket, R. F. D. 2.
*Lecturer.*—Charles W. Morey........................Woonsocket, R. F. D. 2.
*Secretary.*—Mrs. Hattie L. O'Bryan........................Millville, Mass.

Meets on the second and fourth Mondays of each month in Lincoln Hall, Slatersville.

### PERRYVILLE, NO. 14.

*Master.*—Christopher Browning, Jr........................Wakefield, R. F. D.
*Lecturer.*—Wanton R. Card........................Wakefield, R. F. D.
*Secretary.*—Jeffery W. Potter........................Wakefield, R. F. D.

Meets on second and fourth Wednesdays of each month at Perryville.

### SUMMIT, NO. 15.

*Master.*—B. E. Winsor........................Coventry.
*Lecturer.*—........................
*Secretary.*—Miss Grace M. Gorton........................Summit.

Meets the first and third Saturdays of each month at Summit.

### BARRINGTON, NO. 16.

*Master.*—Lewis B. Smith........................Barrington.
*Lecturer.*—Kirtland Wilson........................Warren.
*Secretary.*—Miss Bertha B. Smith........................Barrington.

Meets on the second and fourth Mondays of each month in Barrington Town Hall.

### WESTERLY, NO. 18.

*Master.*—C. Palmer Chapman........................Avondale, Westerly.
*Lecturer.*—Mrs. Lydia Chace........................Watch Hill, Westerly.
*Secretary.*—Mrs. C. J. Babcock........................Westerly.

Meets on the first and third Tuesdays of each month in the vestry of Church at Avondale.

### ROGER WILLIAMS, NO. 19.

*Master.*—James L. Sweetland........................East Providence.
*Lecturer.*—Miss Evelyn Wood................Warren Road, East Providence.
*Secretary.*—Mrs. Maria E. Wilcox.............230 Martin St., East Providence.

Meets alternate Friday evenings, beginning February 10, 1911, at Grange Hall East Providence.

### Conanicut, No. 21.

*Master.*—Ferdinand Armbrust.............................Jamestown.

*Lecturer.*—Mrs. Ferdinand Armbrust..........................Jamestown.

*Secretary.*—Miss Clara E. Clarke.............................Jamestown.

Meets on the first and third Wednesdays of each month at Town Hall, Jamestown.

### Lime Rock, No. 22.

*Master.*—Herbert Harris......................................Lime Rock.

*Lecturer.*—William G. Rich.................11 Longley Building, Woonsocket.

*Secretary.*—Mrs. E. A. Knight.................................Saylesville.

Meets on the second and fourth Fridays of each month at Grange Hall.

### Kickemuit, No. 24.

*Master.*—Amos F. Maker........................................Warren.

*Lecturer.*—Mr. Louis Burleigh..................................Warren.

*Secretary.*—Mrs. Ella A. Barker................................Warren.

Meets on the second and fourth Saturdays of each month at Grange Hall.

### South Scituate, No. 25.

*Master.*—Edwin A. Salisbury..........................Hope, R. F. D. 1.

*Lecturer.*—Henry A. Potter.................................North Scituate.

*Secretary.*—LeRoy A. Salisbury...................................Hope.

### Moosup Valley, No. 26.

*Master.*—John E. Griffiths..............................Greene, R. F. D.

*Lecturer.*—Mrs. Lena M. Griffiths......................Greene, R. F. D.

*Secretary.*—Mrs. Ida Dawley..............................Greene, R. F. D.

Meets on the first and third Wednesdays of each month at Moosup Valley Church.

### Rocky Hill, No. 27.

*Master.*—George W. Godfrey.....................East Greenwich, R. F. D. 2.

*Lecturer.*—J. Foss Magoon......................East Greenwich, R. F. D. 2.

*Secretary.*—Mrs. Ida E. Godfrey.................East Greenwich, R. F. D. 2.

Meets on the first and third Thursdays of each month at Rocky Hill Chapel.

### Portsmouth, No. 29.

*Master.*—Warren R. Sherman......................Melville Branch, Newport.

*Lecturer.*—Mrs. Ellen W. Boyd................................Portsmouth.

*Secretary.*—Miss Phoebe A. Coggeshall.............Melville Branch, Newport.

Meets on the first and third Thursdays of each month at Fair Hall, Portsmouth.

### Aquidneck, No. 30.

*Master.*—Joseph A. Peckham........................Melville Branch, Newport.
*Lecturer.*—Charles H. Ward........................................Newport.
*Secretary.*—Mrs. William C. Hubbell..............................Middletown.

Meets on second and fourth Thursdays of each month at Town Hall, Middletown.

### Nonquit, No. 31.

*Master.*—Mrs. Jessie M. Hathaway..................................Tiverton.
*Lecturer.*—Miss Charlotte M. Manchester..................................
*Secretary.*—William H. Potter.....................................Tiverton.

Meets on the second and fourth Wednesdays of each month at Grange Hall.

### Little Compton, No. 32.

*Master.*—William A. Peckham.................................Little Compton.
*Lecturer.*—Dorothy Wilbour..................................Little Compton.
*Secretary.*—Mrs. Mabel J. W. Carton.........................Little Compton.

Meets on the first and third Wednesdays of each month at Grange Hall, Little Compton.

### Central, No. 34.

*Master.*—Miss Louisa M. Bowen.................................Buttonwoods.
*Lecturer.*—Mrs. Annie Rogers....................................Apponaug.
*Secretary.*—Mrs. Ida M. Thurber.... .............................Apponaug.

Meets on the first and third Tuesday of each month at Central School House, Apponaug.

### Fiskeville, No. 35.

*Master.*—Charles A. Brayton.........................................Hope.
*Lecturer.*—Miss Bertha M. Brayton...................................Hope.
*Secretary.*—Mrs. Abbie Groves.......................................Hope.

Meets on the fourth Tuesday of each month at Hope M. E. Church.

### Slocum, No. 36.

*Master.*—John C. Tallman...................... ...............Slocum.
*Lecturer.*—Mrs. George B. Sweet.................. .................Slocum.
*Secretary.*—Mrs. John C. Tallman...................................Slocum.

Meets on second and fourth Fridays of each month at Grange Hall, Slocum.

### Greenville, No. 37.

*Master.*—Byron S. Williams....................Cherry Hill Avenue, Johnston.
*Lecturer.*—William Watson......................Hopkins Avenue, Johnston.
*Secretary.*—Mrs. L. A. Hill.....................Johnston, R. F. D. 1, Box 69.

Meets on the second and fourth Mondays of each month at Grange Hall, Wilkinson's Block, Greenville.

### Chepachet, No. 38.

*Master.*—G. Edwin Richmond................................Chepachet.
*Lecturer.*—Stephen C. Irons......................North Scituate, R. F. D. 2.
*Secretary.*—George W. Burlingame................North Scituate, R. F. D. 2.

Meets on the first and third Tuesdays of each month at A. O. U. W. Hall, Chepachet.

### North Scituate, No. 39.

*Master.*—Martin S. Smith..............................North Scituate.
*Lecturer.*—M. T. Reynolds.............................North Scituate.
*Secretary.*—Mrs. Annie Atwood.........................North Scituate.

Meets on the first and third Wednesday of each month at Gleanor Chapel, North Scituate.

### Laurel, No. 40.

*Master.*—Lucius B. Steere.......................North Scituate, R. F. D. 2.
*Lecturer.*—Mrs. Vira G. Cole.................................Harmony.
*Secretary.*—Charles R. Aldrich.........................North Scituate.

Meets on the first and third Friday of each month at Waldron's Corners.

### Old Warwick, No. 41.

*Master.*—Frank E. Paine....................................Warwick.
*Lecturer.*—George E. Perry.................................Warwick.
*Secretary.*—Miss Amey S. Hazard............................Warwick.

Meets on the second and fourth Wednesdays of each month at League Hall, near Warwick Depot.

### Oaklawn, No. 42.

*Master.*—W. H. Hervey......................................Oaklawn.
*Lecturer.*—Henry M. Hervey.................................Oaklawn.
*Secretary.*—Wilfred E. Stone..................75 Wayland Avenue, Cranston.

Meets on the second and fourth Tuesdays of each month at Oaklawn.

### PIPPIN ORCHARD, NO. 43.

*Master.*—C. E. Bailey, Jr. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Hope.
*Lecturer.*—Mrs. Barret . . . . . . . . . . . . . . . . . . . . care of Matison Fenner, Oak Lawn.
*Secretary.*—Forrest E. Wyman . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Hope.

Meets on the second and fourth Saturdays of each month at Grange Room. residence of Otis Luther.

### QUIDNESSETT, NO. 44.

*Master.*—A. S. Reynolds . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . East Greenwich,
*Lecturer.*—Emma F. Brown . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . East Greenwich.
*Secretary.*—A. D. Miner . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . East Greenwich.

Meets on the second and fourth Wednesdays of each month at Grange Hall.

### PROVIDENCE, NO. 45.

*Master.*—Charles P. Cornell . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
*Lecturer.*—Frank G. Lawton . . . . . . . . . . . . . . . . . . . . . . . 769 Park Avenue, Auburn.
*Secretary.*—Harry S. Waitt . . . . . . . . . . . . . . . . . . . 206 Lowell Avenue, Providence.

Meets on the second and third Tuesdays of each month at 123 Eddy Street, Providence.

### ANTIOCH, NO. 46.

*Master.*—James H. Richardson . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Thornton.
*Lecturer.*—Miss Irene Bates . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Oaklawn.
*Secretary.*—Miss Frances W. Lawton . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Thornton.

Meets on the first and third Thursdays of each month at Antioch Chapel, 2 miles beyond Thornton.

### WESTCANAUG, NO. 47.

*Master.*—John Bowen . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Clayville.
*Lecturer.*—Miss Vivian Mathewson . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Clayville,
*Secretary.*—Everett S. Mathewson . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Clayville.

Meets on second and fourth Wednesdays of each months at Odd Fellows Hall. Clayville.

# MISCELLANEOUS FACTS AND FIGURES.

William Blackstone, first white settler (1634) in Rhode Island.

Roger Williams settled Providence, June, 1636.

Area of State, 1,053.1 square miles.

Area with Narragansett Bay, 1,300 square miles.

Area Bristol county, 24.3 square miles.

Area Kent county, 169 square miles.

Area Newport county, 117 square miles.

Area Providence county, 410.9 square miles.

Area Washington county, 331.9 square miles.

Greatest length of State, 48 miles.

Greatest width, 37 miles.

Coast line, 400 miles.

Number of cities, 6.

Number of towns, 32.

Population of the State, 542,610.

Gain in the population in five years, 62,528.

Population of Providence, 224,326.

Population of Pawtucket, 51,622.

Population of Woonsocket, 38,125.

Population of Newport, 27,149.

Population of Bristol county, 17,602.

Population of Kent county, 36,378.

Population of Newport county, 39,335.

Population of Providence county, 424,353.

Population of Washington county, 24,942.

Smallest town in area, North Providence, 5.5 square miles.

Largest town in area, South Kingstown, 77.9 square miles.

Area city of Providence, 18.286 square miles.

Highest land in the State, Durfee Hill, Glocester, 805 feet.

Total indebtedness of cities, $31,725,009.77.

Total indebtedness of towns, $4,224,482.04.

Highest rate of taxation in towns, $1.70 per $100.

Lowest rate of taxation in towns, $.60 per $100.

Town and city valuation, real, $408,000,235.

Town and city valuation, personal, 1909, $130,082,623.

Number of post-offices in the State, 190.

Money order offices, 162.

Representatives in Congress, 4.

Number of schoolhouses in the State, 532.

Number of schools in the State, 1,837.

Number of teachers employed, 2,165.

Number of pupils, 66,985.

Estimated value of school property, $7,973,232.

Number of public libraries in the State, 56.

Number of volumes, 503,360.

Militia force in the State, 1,835.

Inmates of State institutions, 2,820.

Latitude of Providence, 41° 49′ 26″.

Longitude of Providence, 71° 24′ 20″.

Difference in time between Providence and Washington, 22 minutes, 35 seconds.

Difference in time between Providence and Boston, 1 minute, 21 seconds.

Number of farms in the State, 5,191.

Number of farmers, 4,694.

Acreage of farms, 442,000 (1910 Census).

Acres improved 178,000 (1910 Census).

Amount expended for labor, 1910, $1,675,000.

Value of hardy plants, fruit, etc., $946,640.

Capital invested in agricultural property, $35,075,208 (1905 Census).

Value of annual product, $7,737,863 (1905 Census).

Rhode Island men in the Rebellion, 24,102.

Rhode Island men killed or died in the Rebellion, 2,769.

Rhode Island war expenditure, $6,500,772.

Square feet of land covered with greenhouses, 1,770,611.

Varieties of native trees and shrubs in the State, 125.

Species of birds in the State, 296.

Species of trees in the State, 46.

Assembly meets, first Tuesday in January.

Legal holidays, January 1, February 22, second Friday in May, May 30, July 4, first Monday in September, October 12, Columbus Day, Thanksgiving, Christmas, election days, and such day as Governor, or General Assembly, or President, or Congress may appoint.

Dams in the State, 441.

Tonnage of the port of Providence, 34,329 tons.

Customs districts in the State, 3.

State Board of Agriculture, instituted 1885.

State senators, one for each city or town, 38.

Representatives, not to exceed 100.

Tons of hay cut in R. I. in 1910, 74,000, farm value, $1,450,400.00.

Bushels of corn produced in State in 1910, 440,000; farm value, $365,000.00.

Bushels of potatoes produce in R. I. in 1910, 816,000; farm value, $563,040.00.

Bushels of oats grown in R. I. in 1910, 68,000; farm value, $32,640.00.

Estimated production of milk in 1910, 13,536,000 gallons.

Average value per head milch cows in R. I. January 1, 1911, $52.50.

Loss per 1,000 head from disease during year ending March 31, 1911. horses, 23; cattle, 21; sheep, 3; swine, 22.

# WEIGHTS AND MEASURES.

## SECTION 25 OF CHAPTER 194 OF GENERAL LAWS OF RHODE ISLAND, 1909.

"SEC 25. The legal weights of certain commodities in the state of Rhode Island, shall be as follows:

" A bushel of apples shall weigh 48 pounds.
A bushel of apples, dried, shall weigh 25 pounds.
A bushel of apple seed shall weigh 40 pounds.
A bushel of barley shall weigh 48 pounds.
A bushel of beans shall weigh 60 pounds.
A bushel of beans, castor, shall weigh 46 pounds.
A bushel of beets shall weigh 50 pounds.
A bushel of bran shall weigh 20 pounds.
A bushel of buckwheat shall weigh 48 pounds.
A bushel of carrots shall weigh 50 pounds.
A bushel of charcoal shall weigh 20 pounds.
A bushel of clover seed shall weigh 60 pounds.
A bushel of coal shall weigh 80 pounds.
A bushel of coke shall weigh 40 pounds.
A bushel of corn, shelled, shall weigh 56 pounds.
A bushel of corn, in the ear, shall weigh 70 pounds.
A bushel of corn meal shall weigh 50 pounds.
A bushel of cotton seed, upland, shall weigh 30 pounds.
A bushel of cotton seed, Sea Island, shall weigh 44 pounds.
A bushel of flax seed shall weigh 56 pounds.
A bushel of hemp shall weigh 44 lbs.
A bushel of Hungarian seed shall weigh 50 pounds.
A bushel of lime shall weigh 70 pounds.
A bushel of malt shall weigh 38 pounds.
A bushel of millet seed shall weigh 50 pounds.
A bushel of oats shall weigh 32 pounds.

A bushel of onions shall weigh 50 pounds.
A bushel of parsnips shall weigh 50 pounds.
A bushel of peaches shall weigh 48 pounds.
A bushel of peaches, dried, shall weigh 33 pounds.
A bushel of peas shall weigh 60 pounds.
A bushel of peas, split, shall weigh 60 pounds.
A bushel of potatoes shall weigh 60 pounds.
A bushel of potatoes, sweet, shall weigh 54 pounds.
A bushel of rye shall weigh 56 pounds.
A bushel of rye meal shall weigh 50 pounds.
A bushel of salt, fine, shall weigh 50 pounds.
A bushel of salt, coarse, shall weigh 70 pounds.
A bushel of timothy seed shall weigh 45 pounds.
A bushel of shorts shall weigh 20 pounds.
A bushel of tomatoes shall weigh 56 pounds.
A bushel of turnips shall weigh 50 pounds.
A bushel of wheat shall weigh 60 pounds.
A barrel of flour shall contain 196 pounds.
A ton of coal, net, shall weigh 2,000 pounds.
A ton of coal, gross, shall weigh 2,240 pounds."

# LAWS RELATING TO AGRICULTURE. GENERAL LAWS, 1909.

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## CHAPTER 119.

### OF CONTAGIOUS DISEASES AMONG CATTLE.

SECTION

1. Penalty for bringing animals infected with contagious disease into the state, or exposing same to other animals.
2. Town councils may pass ordinances to prevent spread of infectious or contagious diseases.
3. Board of Agriculture may prohibit introduction of animals into state; penalty for violation of such prohibition.

4, 5. Duties of board in relation to contagious diseases prevailing among animals.

SECTION

6. Penalty for selling diseased cattle, or milk from same.
7. Board may make necessary regulations for prevention, cure, etc., of disease; mode of compensating owners for cattle killed by order of board; penalty for non-compliance with regulations.
8. Regulations made by board, to supersede those of towns.
9. Orders, etc., how signed.
10. Limitation of prosecutions under this chapter.

SECTION 1. Every person bringing into the state any neat cattle or other animals which he knows to be infected with any infectious or contagious disease, or who shall expose such cattle or other animals, known to him to be so infected, to other cattle and animals not infected with such disease, shall be fined not less than one hundred dollars nor more than five hundred dollars.

SEC. 2. The town councils of the several towns may pass such ordinances as they may think proper, to prevent the spread of infectious or contagious diseases among cattle and other animals within their respective towns, and may prescribe penalties for the violations thereof, not exceeding twenty dollars for any offence.

SEC. 3. The state board of agriculture may prohibit the introduction of any cattle or other domestic animals into the state. Every person who shall bring, transport, or introduce any cattle or other domestic animals into the state, after said board or any one of them shall have issued an order forbidding the same, or after said board shall have published for five successive days in such newspapers published in this state as the said board may direct, an order forbidding such introduction, shall be fined not exceeding three hundred dollars for every such offence; and every officer or agent of any company or other person who shall violate such order, shall be subject to the fine aforesaid. In case of the introduction into the state of cattle or other domestic animals, contrary to the order of said board, the introduction of each animal shall be deemed a separate and distinct offence.

Sec. 4. Said board shall endeavor to obtain full information in relation to any contagious disease which may prevail among cattle or other domestic animals near the borders of the state, and shall publish and circulate such information in their discretion; and should any such disease break out, or should there be reasonable suspicion of its existence among cattle or other domestic animals in any town in the state, they shall examine the cases, and publish the result of their examination, for the benefit of the public.

Sec. 5. Said board may appoint suitable and discreet persons, on or near the several highways, turnpike-roads, railroads, and thoroughfares in the state, who shall inquire into all violations of this chapter, and report the same to said board.

Sec. 6. Every person who shall sell or offer to sell any cattle or other domestic animals, or any part thereof, known to him to be infected with any contagious disease, or with any disease dangerous to the public health, or who shall sell or offer to sell any milk from any such cattle or other domestic animals, shall be fined not exceeding one thousand dollars or be imprisoned not exceeding two years, either or both, in the discretion of the court.

Sec. 7. Said board may make all necessary regulations for the prevention, treatment, cure and extirpation of such disease; and every person who shall fail to comply with any regulation so made shall be fined not exceeding three hundred dollars or be imprisoned not exceeding one year.

Sec. 8. Whenever said board shall make and publish any regulations concerning the extirpation, cure or treatment of cattle or other domestic animals infected with, or which have been exposed to any contagious disease, such regulations shall supersede the regulations made by the authorities of the several towns and cities upon the same subject; and the operation of such regulations made by said authorities shall be suspended during the time those made by said board shall be in force.

Sec. 9. All orders, appointments and notices from said board, except the order of notice provided for in section three, shall bear the signature of the president or chairman and secretary.

Sec. 10. All prosecutions for offences against the provisions of this chapter shall be commenced within thirty days after the same shall have been committed, and not afterwards.

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## CHAPTER 120.

## OF THE RHODE ISLAND STATE BOARD OF AGRICULTURE.

Section
1. Board of agriculture, how constituted.
2. Term of office, and vacancies.
3. Meetings and duties.
4. Agricultural institutes.
5. Secretary; appointment, compensation and duties. Expenses of members of the board.
6. Agricultural societies to make annual returns.
7. Annual report of the board, and how to be distributed.
8. Cattle commissioners.
9. Veterinarians.
10. Animals affected with tuberculosis, glanders, or farcy, to be killed.

Section
11. Appraisers of animals so killed; appointment of, and provision for appeal from their award.
12. Quarantine of animals.
13. Appraised value of animals killed to be paid by state, in whole or in part, when.
14. Persons transporting cattle must produce certificate.
15. Complaints for violation of this chapter, made by whom.
16–19. Of the importation into state.
20. Penalty for concealing tuberculosis.
21. Animals affected by certain diseases to be reported.
22. Penalty for sale of diseased animal.

SECTION
23. Members of board may enter premises.
24. Governor to accept rules made under national law.
25. Inspectors of bureau of animal industry of United States.
26. State not liable under sections 24 and 25.

SECTION
27. Penalties for violation of chapter.
28. Compensation.
29. Monthly report.
30. Prosecutions to be commenced within sixty days.

SECTION 1. The Rhode Island state board of agriculture shall be constituted as follows: the governor, lieutenant-governor, and secretary of state shall be *ex-officio* members of said board; one member shall be appointed from and by the board of managers of the Rhode Island College of Agriculture and Mechanic Arts; one member shall be appointed from and by each of the agricultural societies which receive an annual bounty from the state; one member shall be appointed by and from the Rhode Island State Grange, Patrons of Husbandry; and three members shall be appointed by the governor with the advice and consent of the senate. Of the members so appointed by the governor at least one shall be a resident of Providence county.

SEC. 2. The members of said board hereafter appointed by the agricultural societies or grange named in section one of this chapter shall hold their offices until the first day of February in the second year after their appointment. Any vacancy which may occur in their number shall be filled for the unexpired term in the manner provided for making the original appointment. At the January session of the general assembly in each year the governor, with the advice and consent of the senate, shall appoint some persons to be members of said board to succeed the members whose terms will next expire; and the members so appointed shall hold their offices until the first day of February in the second year after their appointment. Any vacancy which occurs in their number when the senate is not in session shall be filled by the governor until the next session thereof, when he shall, with the advice and consent of the senate, appoint some person to fill such vacancy for the remainder of the term.

Sec. 3. The board shall meet at least twice in each year at the state house in Providence, and may meet at such other times and places as may be deemed expedient. It shall be the duty of the board to look after the agricultural interests of the state, the promotion of agricultural education, and the general interest of husbandry throughout the state. The board may cause to be analyzed samples of such commercial fertilizers as may from time to time be offered for sale in this state, and may collect and distribute such seeds, plants, shrubs and trees as may be in their power to procure from all sources. They may also take, hold in trust, and exercise control over donations or bequests for promoting agricultural education for the general interest of agriculture.

Sec. 4. The board shall hold one agricultural institute in each county annually, either independently or in connection with any society, association or other organization devoted to the same general objects, and may hold as many more as it shall deem expedient, and shall, as far as may be practicable, encourage state and local associations and societies in the interests of agriculture.

Sec. 5. The board may appoint, and prescribe the duties of a secretary, who shall receive for his services, out of the appropriation for the use of the board, such sum as the board may direct, and also his necessary expenses while travelling by direction of the board. No member of the board shall receive any compensation for his services as such, but shall be entitled to receive such expenses as are necessarily incurred in the legitimate discharge of his duties.

Sec. 6. Every agricultural and kindred society receiving a bounty from the state shall make an annual return to the state board of agriculture during the month of December in each year, on such matters and in such form as shall be prescribed by said board; and any society neglecting to comply with the requirements of the board shall not be entitled to the allowance from the state, as by law provided, for the ensuing year.

Sec. 7. The board shall report annually to the general assembly at its January session. Two thousand copies of its report shall be printed by the state printers under contract to the state. The board shall distribute one copy of the report to each member of the general assembly, one to the town clerk of each town in the state for the use of the town, one to each public library, and a proper number to the agricultural school and experiment station, agricultural societies, farmers' clubs and granges in the state, and shall make such exchanges with other like organizations as may be deemed expedient. The board may cause to be printed and distributed from time to time, in pamphlet form, such analyses of commercial fertilizers, and such other information, as the interests of agriculture may require.

SEC. 8. The board may appoint one or more commissioners in each county of the state, whose duty it shall be to visit and inquire into the condition of any domestic animal in their respective counties whenever there is reason to suspect that any such animal, or the carcass of any such animal, is affected with tuberculosis, or other contagious, infectious or communicable disease; and the commissioners in their respective counties are authorized to quarantine any such animal, or the carcass of any such animal, until inspected by the veterinarian employed by the board.

SEC. 9. The board may employ veterinary surgeons.

SEC. 10. Whenever any animal shall be suspected by either of the cattle commissioners to be affected with tuberculosis, the commissioner of the county where the animal is found shall immediately notify the secretary of the state board of agriculture, who shall promptly fix a day when the appraisers, duly appointed as hereinafter provided, shall visit the suspected animal with the veterinarian; and upon confirmation of the disease, and after appraisement of the value as hereinafter provided, the affected animal shall be killed and the carcass disposed of in such a manner as will not be detrimental to the public health. Anyone having reason to suspect that any horse or other animal is affected with glanders, farcy, or any contagious or communicable disease, shall immediately report the same to the secretary of the state board of agriculture or to the general agent of the Rhode Island Society for the Prevention of Cruelty to Animals, who shall notify the veterinarian employed by the state board of agriculture, or such veterinarians as may be duly appointed by the Rhode Island Society for the Prevention of Cruelty to Animals and approved by the state board of agriculture, and the veterinarian so notified shall promptly examine the suspected animal; and if found to be affected with glanders, farcy, or any contagious or communicable disease, the said veterinarian shall cause said animal to be killed and the carcass to be disposed of in such manner as shall not be detrimental to the public health. If the veterinarian so appointed by said Rhode Island Society for the Prevention of Cruelty to Animals and appointed by said state board of agriculture shall become unsatisfactory to said board, on notice thereof to said veterinarian from said board said veterinarian shall cease to have any powers or authority under this chapter, and said Rhode Island Society for the Prevention of Cruelty to Animals may thereupon appoint some other veterinarian in his place and stead, to be approved by said board as aforesaid.

Sec. 11. For the purposes aforesaid the veterinarian, with one of the cattle commissioners in each county, shall constitute the board of appraisers for said county, and the estimate of value by such two persons shall be final: *Provided,* that not more than fifty dollars shall be allowed for any single native animal, nor more than seventy-five for any single grade animal, nor more than one hundred dollars for any single registered animal, and written notice of the amount of the appraisal, signed by the board of appraisers, shall be immediately given to the owner or claimant of said animal; *and provided, further,* that any party aggrieved by any award made under the provisions of this section may appeal therefrom to said board within five days after the receipt of said notice.

Sec. 12. The board of appraisers is hereby authorized to quarantine any animal or animals supposed to be affected with a contagious, infectious, or communicable disease, and one-third of the cost of such quarantining shall be assumed and paid by the state, except as otherwise provided in section twenty-six of this chapter.

SEC. 13. The state shall pay to the owner of any tuberculous animal, killed under the provisions of section ten of this chapter, one-half of its appraised value; but if upon post-mortem examination it shall be found that the slaughtered animal was not affected with tuberculosis, then the animal so killed shall be paid for at its full appraised value: *Provided,* that the state shall not pay for any diseased animal so killed if the animal has not been owned by some person in the state and found in the state three months previous to the day of slaughter. It shall be the duty of the cattle commissioners of the several counties to demand of the owner of the animal or animals killed under section ten of this chapter that the premises where the diseased animal or animals have been kept shall be thoroughly cleansed and disinfected to the satisfaction of the cattle commissioners of their respective counties, and the board shall direct what said cleansing and disinfecting shall consist of.

SEC. 14. All persons, corporations or companies intending to ship, transport, or to drive cattle into the state, must produce a certificate to the effect that the cattle to be so shipped, transported, or driven, are free from tuberculosis as far as may be determined by physical examination and the tuberculin test. The certificate shall give a description of each animal brought into the state sufficiently accurate for identification, and shall give also the date and place of examination of each animal, the preparation of tuberculin used, the quantity injected, the temperature immediately before inoculation, the temperature at the eleventh hour, and every two hours subsequent thereto, for at least ten hours, or until the reaction is completed. The certificate shall be signed by a veterinarian who is a graduate of a recognized veterinary college, and shall be sent immediately to the secretary of the state board of agriculture, who shall immediately notify a commissioner of the county into which the cattle are to be shipped, transported or driven, and said commissioner shall examine the cattle to identify them. Failure to comply with the provisions of this section shall be considered a misdemeanor, punishable by a fine not to exceed one hundred dollars.

SEC. 15. Complaints for the violation of the provisions of section fourteen shall be made by the secretary of the state board of agriculture, and said secretary shall be exempt from giving surety for costs on any complaint made as aforesaid.

SEC. 16. All persons desiring to import cattle into this state, or from other states, without obtaining the certificate required by section fourteen of this chapter, shall give written notice to the cattle commissioner of the county into which the cattle are brought, within forty-eight hours after the arrival into the state of such cattle and such notification shall contain a specified list of the cattle so imported, with a full description of age, sex, and such other particulars as may be necessary for the identification of the said cattle, and the place where they can be found.

SEC. 17. Upon the receipt of such notification the cattle commissioner of the county into which said cattle are imported shall proceed within seventy-two hours to the place designated, and make a physical examination of said cattle; and if upon such examination said cattle shall be deemed free from tuberculosis, it shall be so certified by said cattle commissioner upon a permit, and a duplicate thereof, to be given to the owner of said cattle, and the cattle shall be released for the use and benefit of the owner.

SEC. 18. If after such examination the cattle commissioner shall be of the opinion that the cattle or any of the cattle so examined are afflicted with tuberculosis, he shall require of the importer that the suspected cattle be tested with tuberculin, said test to be applied by a veterinarian who is a graduate of a recognized veterinary college, who shall give to the said commissioner a certificate in writing that such test has been applied, together with a statement of the tuberculin used, quantity injected, temperature of each animal before inoculation and at the eleventh hour and every two subsequent hours thereafter for at least ten hours, or until reaction is complete, and a duplicate thereof shall be given to the owner of said cattle, and the original certificate shall be sent by the said commissioner to the secretary of the state board of agriculture. If after such test it shall be proved that such suspected cattle are afflicted with tuberculosis, such diseased cattle shall be immediately slaughtered upon written order of said commissioner, and the state shall not be required to compensate the owner for their loss, and the owner shall pay for testing such cattle with tuberculin; but if such cattle shall be found free from tuberculosis they shall be released for the use and benefit of the owner. If any such cattle are slaughtered, and upon post mortem examination it shall be found that the slaughtered animal was not afflicted with tuberculosis, then the animal so killed shall be paid for by the state at its full appraised value, in accordance with the provisions of section eleven of this chapter.

Sec. 19. Any person violating any of the provisions of sections sixteen, seventeen, and eighteen of this chapter shall be deemed guilty of a misdemeanor, and shall be fined not more than one hundred dollars.

Sec. 20. When any person shall be shown to have knowingly brought into this state an animal suffering, or suspected to be suffering, with tuberculosis, or to have concealed the existence of such disease in any animal owned by him, such person shall not be entitled to any compensation for the animal slaughtered under this chapter, and shall be deemed guilty of a misdemeanor, and upon conviction, shall be fined for such offence not exceeding one hundred dollars.

Sec. 21. All persons having knowledge or reasons to suspect that any neat cattle or bovine animal has the contagious pleuro-pneumonia or Texas cattle-fever, or that any horse has glanders or farcy, or that any bovine animal or horse has any other highly contagious, infectious or communicable disease dangerous to public health, shall make report concerning the same by mail or otherwise to the secretary of the state board of agriculture immediately, giving the name of the owner or custodian of the said animal or animals and the place of keeping of the same.

Sec. 22. No person having the care or custody of any animal having any one of the diseases mentioned in the preceding sections shall, knowing the same to have any such disease, sell or exchange, or permit the removal, use or driving of the same upon any public highway, or the exposure of the same to contact with any other healthy animal of the same kind except by permission of some member or agent of the state board of agriculture. Any person so doing shall be deemed guilty of a misdemeanor, and on being convicted shall be fined not exceeding one hundred dollars.

Sec. 23. The state board of agriculture, or its duly authorized representatives, having reason to suspect the existence of any of the diseases mentioned in this chapter upon any grounds or premises, are hereby authorized and empowered to enter upon such grounds or premises for the enforcement of the provisions of this chapter.

Sec. 24. The governor is hereby authorized to accept on behalf of the state the rules and regulations prepared by the commissioner of agriculture under and in pursuance of section three of an act of congress approved May twenty-ninth, eighteen hundred eighty-four, entitled "An act for the establishment of a bureau of animal industry, to prevent the exportation of diseased cattle, and to provide means for the suppression and extirpation of pleuro-pneumonia and other contagious diseases among domestic animals," and to co-operate with the authorities of the United States in the provisions of said act.

Sec. 25. The inspectors of the bureau of animal industry of the United States, in co-operation with the state board of agriculture, or with any agent of the state board of agriculture, shall have the right of inspection, quarantine, and condemnation of animals affected with any contagious, infectious, or communicable disease, or suspected to be so affected, or that have been exposed to any such disease, and for these purposes are hereby authorized and empowered to enter upon any grounds or premises. Said inspectors, in co-operation with the state board of agriculture, or with any agent of the state board of agriculture, shall have the power to call on sheriffs, constables, and peace officers to assist them in the discharge of their duties in carrying out the provisions of the act of congress approved May twenty-ninth, eighteen hundred eighty-four, establishing the bureau of animal industry, or the provisions of the board of agriculture, and it is hereby made the duty of sheriffs, constables, and peace officers to assist said inspectors or agents when so requested, and said inspectors or agents shall have the same power and protection as peace officers while engaged in the discharge of their duties.

SEC. 26. The state shall not be liable for any damages or expenses incurred under sections twenty-four and twenty-five of this chapter.

SEC. 27. Any person or persons who shall wilfully or intentionally interfere with any officers, duly authorized to carry out the provisions of this chapter, or who shall wilfully or intentionally violate the provisions of the quarantine authorized by section twelve of this chapter, shall be deemed guilty of a misdemeanor, and upon conviction shall be liable to imprisonment not exceeding three months, or a fine not exceeding one hundred dollars, or both, at the discretion of the court.

SEC. 28. The state board of agriculture is hereby authorized to fix the compensation of the cattle commissioners and veterinary surgeons, to prescribe their duties, and to remove them when deemed expedient so to do.

SEC. 29. The secretary of the state board of agriculture shall make a monthly report to the governor, of the obligations of the state board of agriculture; and the state auditor is hereby directed to draw his orders on the general treasurer for the payment of the same upon vouchers approved by the governor.

SEC. 30. All prosecutions for offenses against the provisions of this chapter shall be commenced within sixty days after the same shall have been committed and not afterwards.

## CHAPTER 240.

Of the General Laws of Rhode Island, 1909.

### AN ACT TO AUTHORIZE THE STATE BOARD OF AGRICULTURE TO APPOINT A STATE NURSERY INSPECTOR, AND TO PROVIDE FOR THE PROTECTION OF TREES AND SHRUBS FROM INJURIOUS INSECTS AND DISEASES.

*It is enacted by the General Assembly as follows:*

SECTION 1. The state board of agriculture may annually appoint some person, qualified by scientific training and practical experience, to be state nursery inspector, who shall be responsible to the board for the performance of his duties as prescribed in this act.

SEC. 2. It shall be the duty of the state nursery inspector to inspect, under the direction of said board, all nurseries or places in the state where nursery stock is grown, sold or offered for sale, and if no dangerous insect or fungous pests are found therein, a certificate to that effect shall be given. If such pests are found therein the owner of the stock shall take such measures to suppress the same as the state nursery inspector shall prescribe, and no certificate shall be given until the said inspector has satisfied himself by subsequent inspection that all such pests have been suppressed.

SEC. 3. Owners of nurseries or of places in the state where nursery stock is grown, sold, or offered for sale, who do not hold an unexpired certificate of inspection after the first annual inspection made after the passage of this act, who shall sell or otherwise dispose of nursery stock in the state shall be subject to a penalty of not less than ten nor more than fifty dollars for each offence.

SEC. 4. Owners of nurseries or of places in the state where nursery stock is grown, sold, or offered for sale, who shall fumigate with hydrocyanic acid gas all stock which they sell, using at least two-tenths of a gram of potassic cyanide to every cubic foot of space contained in the box, house, or other place wherein this fumigation is performed, which place shall be gas tight, and who shall expose the said stock to the fumes of this gas of the strength aforesaid for at least forty minutes, or who shall treat the stock which they sell by some other method approved by the state nursery inspector, and who shall make affidavit before an officer authorized to administer oaths that all stock sold by them has thus been fumigated or treated, and who shall attach a copy of such affidavit to each package, box, or car of stock sold, shall be exempt from the provisions of sections two and three of this act.

SEC. 5. All nursery stock shipped into this state from any other state, country, or province shall bear on each box or package a certificate that the contents of said box or package have been inspected by a duly authorized inspecting officer and that said contents appear to be free from all dangerous insects or diseases. In case nursery stock is brought within the state without such a certificate the consignee shall return it to the consignor at the expense of the latter: *Provided, however*, that any package or box bearing a certificate of fumigation which meets the requirements specified in section four of this act may be accepted as though bearing a proper certificate of inspection.

SEC. 6. The state nursery inspector shall at all times have the right to enter any public or private grounds in the performance of any duty required by this act. He shall receive from the annual appropriation of the state board of agriculture such compensation as said board may determine.

SEC. 7. This act shall take effect upon its passage.

# Reports of Entomological Department.

## RHODE ISLAND STATE BOARD OF AGRICULTURE.

A. E. Stene—Entomologist.
Horace W. French, Clifton W. Loveland, Assistants.
Arthur C. Miller—Inspector of Apiaries.
John Sweeney—Field Agent, Gypsy Moth Work.

**NURSERY INSPECTION.**

**INSECT NOTES.**

**REPORT OF APIARY INSPECTION.**

**GYPSY AND BROWN-TAIL MOTH WORK.**

**THE GYPSY AND BROWN-TAIL MOTH SITUATION.**

**ELM BEETLE WORK.**

**SAN JOSE SCALE WORK.**

**BEE KEEPING IN RHODE ISLAND.**

A brief circular giving a few suggestions on Bee Keeping, Bee Diseases and How to Treat Them, the New Apiary Inspection Law and How to Profit by It.

**HOW TO KEEP BEES.**

A bulletin intended to give quite full directions in regard to Methods and Practices Employed in Bee Keeping.

PROVIDENCE:
E. L. FREEMAN COMPANY, STATE PRINTERS.
1911.

# INTRODUCTORY.

Economic entomology or that science which deals with the study of injurious insects and methods of control has become of tremendous importance during the past twenty-five years. Careful estimates have shown that injurious insects cause damage to our agricultural crops equal to ten per cent. of the total annual production and amounting to between seven and eight hundred million dollars a year. Economic entomology is proving that a large part of this great loss can be averted, and every state in the Union is now expending some money in the application of known methods of control, and many are devoting funds to the careful study of the life histories of the principal insects and in devising new and improved methods of combatting them.

We are only on the threshold of development in this line of work. People generally have not fully learned how great a saving of crops and plantations of all kinds can be accomplished through the control of insect pests, and as a result, support of the work is generally inadequate and sometimes intermittent. It behooves the entomologists of the present day to demonstrate, so far as funds will permit, what can be done, and to encourage the people to study the problems for themselves and learn to apply up-to-date methods in preventing damage to their crops. Such study and effort are of immense advantage to the grower. It often takes quite a while before some people are convinced of the necessity for entomological work, but where the warnings of scientists are unheeded, the insects themselves eventually convince the skeptical of the futility of the let-alone method. This has been amply demonstrated in the case of the gypsy moth campaign in Massachusetts.

In view of these facts, the Rhode Island State Board of Agriculture is to be congratulated on the stand taken by its members. The criticism that the Board is misnamed and that it gives little heed to matters of agricultural interest has been thoroughly refuted. As should be the case, it is ahead of public opinion and where the necessary financial support and legislative approval can be secured, it is endeavoring to promote the welfare of agriculture to the fullest extent. As an instance of the progressive stand in the work of economic entomology may be mentioned the approval by the Board of the organization of an Entomological Department. In itself this is perhaps of little importance, since the work now being done would probably be as effectively accomplished without a departmental organization, nevertheless, it is frought with greater possibilities for future development and permits of better planning of the work.

As this organization of the department marks in a way an epoch in the history of this particular line of work, it may be well to insert here a few historical notes. The first entomological work that the writer did under the direction of the Board was nursery inspection. Although at various times the Board had encouraged the publication of information on injurious insects, and had endeavored to arouse public opinion to a realization of the need of effort in this line, this was the first entomological work provided for by the State Legislature, and was done pursuant to an act passed April 13, 1904.

Since then the duties of the Board have been added to at various times. As a result of the efforts of a number of public-spirited citizens and organizations, an appropriation for the suppression of the gypsy moth was passed in 1906. In 1907 the act was changed to some extent and the administration of the work placed in the hands of the Board.

At the instance of the Board, a resolution appropriating a small sum of money for the dissemination of information regarding the control of the San Jose scale was passed by the legislature during the January session, 1908. Also at the request of the Board, the January session of the legislature, 1909, provided an appropriation for the control and suppression of the elm leaf beetle. These appropriations have been repeated in somewhat varying amounts during subsequent years. In 1910 the January session of the legislature passed a very excellent bee inspection law which has been in force since June.

Since 1904 an effort has been made to send out information in regard to insect pests and plant diseases. Annual reports of the work have been rendered in which have been given more or less general entomological information as well as statements in regard to the work accomplished. Special bulletins on the gypsy and brown-tail moth, the San Jose scale, and the elm leaf beetle and tussock moth have been issued. In addition, numerous articles have been written from time to time for the newspapers, and shorter reports have been made for the different sessions of the legislature. A number of lectures pertaining to injurious insects and spraying have been delivered. Definite office days at the State House have also enabled the writer to reach through personal interviews and by telephone a great many people who have been interested in problems of insect control and the care of plants in general.

An effort has been made to study our more important insect pests and to record information in regard to them. As part of this work, a collection of our most injurious forms was begun three years ago for the purpose of placing in the State House where it would be accessible to anyone as complete life histories of such injurious insects as everyone should know. An excellent cabinet for this collection has been provided and a large number of specimens have been placed in the cases. As part of this work a blank form is being prepared which will facilitate the collecting and filing of information in regard to our injurious insects.

In this work valuable assistance has been given by Mr. William Moore, a Cornell student, and by Mr. William C. Polk and Clifton W. Loveland, both residents of this State. It may be added, too, that Mr. Loveland has helped out greatly during the past year, not only in collecting insects, but in gathering data as to the prevalence and work of certain species and in the nursery inspection work.

As part of the plan of the Board to facilitate the work as much as possible, Mr. H. W. French, a graduate of the Massachusetts Agricultural College, was appointed in June of this year as an assistant in the Department. Owing to the lack of funds, it was impossible to continue him in the position and he accordingly resigned January 31, 1910.

As already stated, the legislature of 1910 passed an excellent bee inspection law, the execution of which was placed in the hands of the Board, and by them referred to the Entomological Department. With the approval of the Board, the writer appointed Mr. Arthur C. Miller, an extensive bee keeper and indefatigable worker for the upbuilding of bee keeping in the State, as Deputy Inspector of Apiaries. Since his appointment Mr. Miller has visited a number of sections of the State, especially those where diseases might possibly have been introduced from neighboring states where they are known to occur, or from which information has come indicating that the bee keepers were having trouble. As will be noted by Mr. Miller's report, however, no evidence of serious disease was found. When trouble has been experienced, it has been due to oversight or lack of experience on the part of the bee keeper, and Mr. Miller has often been able to give valuable instruction to owners of apiaries which will enable them to overcome their difficulties in the future.

In passing it may be said in regard to apiary inspection, as in regard to any inspection, that its greatest benefit may not come through preventing the introduction of diseases or through a direct checking of their spread, but from its educational features. In carrying out his duties, the inspector is able to call attention to many points of value; inspection arouses greater interest, stimulates request for further information in regard to the industry, and tends to lift it to a higher and more dignified plane.

It is needless to say that the work of the Entomological Department has increased manifold since the Board of Agriculture entered upon this line of work by taking up the nursery inspection. As the writer must devote one-half of his time to the work of the Extension

Department of the State College, which has also grown very largely during the past six years, it is evident that the amount of detail as well as supervision connected with the work taxes his time to the utmost. The writer is very glad, however, to register his grateful acknowledgement for the cordial support of his work on the part of the Secretary and the individual members of the Board, and for their patience when work has been delayed on account of the lack of time; and, finally, for their manifest effort to provide help in the work, so far as funds will allow.

# NURSERY INSPECTION.

The report for the year of this work is largely a repetition of routine performance. The nursery business has been prosperous, and our nurserymen report a good trade and fair returns.

Inspection laws are now in force over the entire country and as a result, the nurseries of the various states have been placed on practically the same plane. Inspection has weeded out a great many careless and indifferent growers who belonged to the class of men that delve into almost every new thing that they hear of as profitable without the necessary preparation or ability to make a success of any of them. The careless or ignorant nurseryman has less chance of foisting the results of his poor work on the public, and as a result, prices are much steadier. Better returns have enabled the up-to-date nurserymen to put their nurseries into better shape, and the writer is glad to state that a majority of the nurserymen in Rhode Island have taken advantage of the opportunity.

During the year 22 places have been visited by the writer or his assistants. Sometimes two or three visits have been necessary, and a total of 45 visits was made to the different nurseries or places where stock was reported for sale. Many of these places proved to be simply greenhouses or gardeners who were growing greenhouse stock or shrubs for their own use, and only 15 places can be reported as qualified nurseries or places where nursery stock is exposed for sale. Of these 11 have been found to be clear of insects pests and have been granted certificates for the year.

With reference to importations of nursery stock from abroad, we have had the same amicable arrangement with collectors at the ports of Providence and Newport as was in force last year. In addition, through the courtesy of the Bureau of Entomology, Department of Agriculture, Washington, D. C., we have had prompt notification of the expected arrival of stock from abroad, and this has enabled us to inspect all stock that has come into the State from foreign countries.

At Newport, Mr. Alexander MacLellan has been in charge of this work, and in Providence the inspection has been done by Mr. French and Mr. Loveland. We are glad to note that these inspections reveal greater care on the part of foreign shippers and probably thorough inspection of all outgoing stock on the part of entomologists in the service of foreign countries from whence shipments were made.

The writer would repeat his recommendation made in several previous reports that the nursery inspection law should be modified and brought up to date. It is faulty in many respects which have been mentioned and need not now be repeated. The experience of about ten years' work in nursery inspection in the various states of the Union has demonstrated the advantages and shortcomings of nursery laws as they were first passed. Our law makers should now see to it that the laws are amended in such a way as to bring them abreast of the present-day knowledge of inspection work.

Such benefit as has accrued to the nurserymen from the operation of the nursery inspection laws should be available for the orchardists of the State through the enactment of a provision for orchard as well as nursery inspection. It is to be hoped, therefore, that our legislature may see fit to pass such acts as shall be of help to the orchardists of the State and aid in developing the very important industry of fruit growing.

# INSECT NOTES.

The San Jose scale, which has given the orchardists and growers of trees and shrubs generally such great difficulty during the last eight or ten years, seems to be slightly on the wane and is no longer doing such extensive damage. This is undoubtedly due in part to a natural checking of the insect by parasites and diseases and partly to a better knowledge on the part of growers of methods of treatment, and greater thoroughness in their application. This lull in the ravages of this pest should not by any means be construed to mean that we shall have no further trouble from it. Like the potato bug, it will probably always be with us, but we can take courage from our experience with the last-named insect to feel that by the application of up-to-date methods such as developed through the work of economic entomologists, the San Jose scale may be as fully controlled as the potato bug.

Among other insects of the year may be mentioned the Birch Leaf Skeletonizer, *Bucculatrix canadensisella;* Box Leaf Miner, *Monarthropalpus buxi;* and the Orange Striped Oak Caterpillar. The first and last of the above named insects are discussed by Mr. Loveland whose report is appended. The box leaf miner is interesting, particularly because it is a European insect reported for the first time in America. It was sent to this office by Mr. Bruce Butterton of Newport, and at once recognized as something unusual. It was forwarded to a specialist in the group of insects to which it belonged, who reported that it was probably an introduced pest. Later on he confirmed this statement and identified the insect as above named.

## Notes on Some Insects of the Year.

By C. W. Loveland.

During the summer of 1910 I was employed in collecting and mounting specimens of some of the injurious insects of Rhode Island for display in the cases in the room of the Board of Agriculture, doing this work under the direction of the State Entomologist, Professor A. E. Stene. While so employed I made various notes and observations of the work of these insects in the field. I am herewith setting down a brief summary of said observations with the hope that it may be of some little value to the Board in their further attempts to control and eradicate these various pests. In carrying on the work I visited nearly all the towns and villages of Bristol, Providence, and Kent counties.

Throughout the whole of the district visited the Cabbage Worm (*Pieris rapæ*) has everywhere been destructive. The total damage accomplished by it will reach thousands of dollars annually. As this insect has few natural enemies it seems to be increasing in numbers every year. The only check, and that a slight one, is produced by a parasitic Braconid Fly. There are several broods of the cabbage worm during the summer. I found that very little was being done by the growers of cabbages to prevent the damage, and what little was attempted was mostly futile; the remedies applied being mostly dry powders, Pyrethum and Hellebore. These powders lose their effectiveness in a very short while when exposed to the air. Probably the prejudice against Paris Green has prevented the use of this sure remedy on cabbages. This or any of the arsenites afford the best remedy when sprayed on the growing cabbages at the rate of about one pound in one hundred fifty gallons of water. Unless the user is exceptionally careless there is not the least danger in the use of this mixture. The cabbage head forms from within, the leaves unfolding from the center of the head, and do not fold together to make it. On that account whatever poison is placed upon the plant can only fall upon the outside leaves and none can get into the head itself. As Dr. John B. Smith says in his Economic Entomology, "The amount used to a single cabbage head is so minute that to really poison a man it would be necessary to eat about twelve heads, outer leaves and all, and then if death resulted I would be inclined to attribute it rather to the cabbage itself than to the Paris Green or other arsenite employed." The larvæ succumb to the poison very readily and by making the application early in the season the later broods may be materially reduced in number. In ordinary farm practice the heads are cut out and shipped, and in preparing the cabbage for food the outer leaves of these heads are generally taken off by the housewife because more of less bruised or injured, before they are cooked. Chemical analysis has shown that on a head so prepared within a week of a heavy application of Paris Green not a trace of arsenic remained. I have yet to learn of the first case of arsenical poison from the use of cabbage when so treated.

Observations made upon the work of the codling moth (*Carpocapsa pomonella*) indicate that the damage done to apple orchards is second only to that done by the San Jose scale. The codling moth lays its egg upon the young apple at the time when the blossom has just fallen. The young caterpillar hatches in a few days, and then in a short while bores its way into the young apple itself, feeding around the core. This frequently causes the apples to drop. I have found during August that the ground was practically covered with these fallen apples, and that in almost nine cases out of ten the apple worm was on the inside. The larvæ crawl under the bark of apple trees where they winter over and finally pupate in early spring. There are generally two broods, the second one passing the winter in the larval stage as above noted. Here the hairy and downy woodpeckers feed on some of the larvæ, but the supply of woodpeckers is altogether too small to accomplish much in holding this insect in check. The only remedy is spraying with an arsenical solution, and this to be effective must be done just after the petals have fallen.

I made a study of the Pine Tip Borer. Wherever there was a considerable growth of young pines, at least one-third of the growing tips were killed by the work of these borers. A single egg is laid by the moth on the side of the growing tip, about one inch from the very top. The young larvæ upon hatching penetrate the tip and bore downward from three to five inches, leaving the stalk with only the thin outer bark. The insect sometimes pupates within the shell, but more often does so on or under the ground. I found a good proportion of the larvæ had been parasitized by Ichneumon Flies.

Another borer (*Retinia comstalkiana*) whose work is very similar was found to be quite abundant in some localities. The moth lays eggs on the lateral shoots of pines. The larvæ work in and bore outward, leaving a gummy excretion at the point of entrance. This one I found quite generally parasitized, and yet a good many must escape, for in places the tips of the pines looked as if they had been touched by fire.

The birches are attacked by a number of different borers: some enter by a small round hole and penetrate to the heart wood; another enters by a similar hole and makes a complete circle around the sap wood, emerging from the same hole. This always kills the young birch. Another works just under the bark in a series of serpentine grooves whose total length sometimes exceeds twelve feet. The birches are sometimes girdled by a weevil. The work of another beetle makes a sort of pit inside of the bark of the larger birches which turns black and from which emerges considerable sap. This is caused by a colony of small larvæ. I am still working on the problem of birch borers and hope to have more definite results to report at a later date.

I found that the Birch Bucculatrix had, during the latter part of August and the first of September, attacked the leaves of nearly every white birch tree in the town of West Greenwich and the western part of Coventry. These small insects kill the leaves by eating the lower surface and when the infestation is general the region gets the appearance of having been swept by fire. This pest may have commenced its work too late in the season to produce any great harm to the trees themselves in a single year, but a repetition of this condition for a few years in succession would undoubtedly produce disastrous results. In these towns the Orange Striped Oak Worm (*Anisota senatoria*) was very abundant on scrub oaks and wherever found, generally stripped the young oaks of most of their leaves.

While the Elm Leaf Beetle (*Galerucella luteola*, Mull.) was not found to be quite so abundant as in 1909, it was still present in such numbers as to completely defoliate many beautiful elms. It has also extended its territory farther into the country districts. The result of the depredation of this pest began to show in an alarming manner during the summer of 1910 in many localities. Many a heretofore majestic elm failed to put forth any leaves at all, while some, not quite dead, made weak attempts to clothe themselves with green. I believe that a campaign should be waged against the Elm Leaf Beetle during the coming summer. Indeed, unless this is done, another year will see the passing of many a beautiful tree. In fact, it is already too late to save a very large number. In addition to spraying, I would suggest the banding of the elm trees with some contrivance to entrap the larvæ when descending to the ground to pupate. A small metal trough filled with oil with a lip of burlap closely fastened to the tree would, I think, destroy thousands of the larvæ at this stage. If my observations are correct, at least seventy-five per cent. of the larvæ descend by way of the main trunk to the ground to pupate. I have taken over a quart from one band of burlap. Since some of the larvæ fall directly to the ground to pupate, the method of capture here suggested should be merely supplementary. It might be used where the expense of spraying is prohibitory. I believe the work of attempting to control the elm leaf beetle should be undertaken by the State by methods similar to those used in controlling the gypsy moth.

The Tent Caterpillar (*Clisiocampa americana*) seemed more abundant than usual last spring. It was interesting to note that several birds seemed to feed directly upon the larvæ in the tent. I noticed among others so feeding the Goldfinch, the Myrtle Warbler, a Baltimore Oriole, and one female Orchard Oriole. The Fall Web Worm was also very numerous during the past year, feeding on various kinds of trees and shrubs.

From a careful comparison of those farms where intelligent spraying is carried on with those where it is not, there can be but one conclusion, namely, that such spraying pays. He who wishes to make a successful living from orcharding, in Rhode Island, has an excellent opportunity so to do if he will learn and apply the modern lessons in spraying. Moreover, I believe your Board will find it profitable to seek to co-operate with the Bird Commission in their attempts to bring about a better enforcement of the laws relative to the protection of insectivorous birds. By this I mean no reflection on the work of the Bird Commissioners, but suggest co-operation along a supplementary line, such as the giving of lectures before granges, the distributing of bird literature in the rural districts and the disseminating of facts relative to the economic importance of birds, especially the "Bob White," among agriculturists generally. The birds are nature's aerial police, and if they existed in such numbers as formerly we would not need to spend so much time and labor in mechanical methods for the control of our numerous insect pests.

# APIARY INSPECTION.

### REPORT OF ARTHUR C. MILLER.

During the season of 1910 the inspector examined bees in the towns of Wickford, Warwick, Foster, Scituate, Johnston, Cranston, Warren, Barrington, East Providence, and Providence. Thirty apiaries were visited and two hundred and six colonies examined.

No contagious diseases were found. Most of the apiaries were equipped with modern hives and appliances, but in the majority of cases the owners had failed to use them to the best advantage, generally from lack of knowledge, but sometimes from unsatisfactory returns in previous seasons.

The inspector's visits were welcome and he was able to render assistance and instruction, the value of which was subsequently evident in increased crops.

Fruit growers are better realizing the importance of the bees in the full pollination of the bloom.

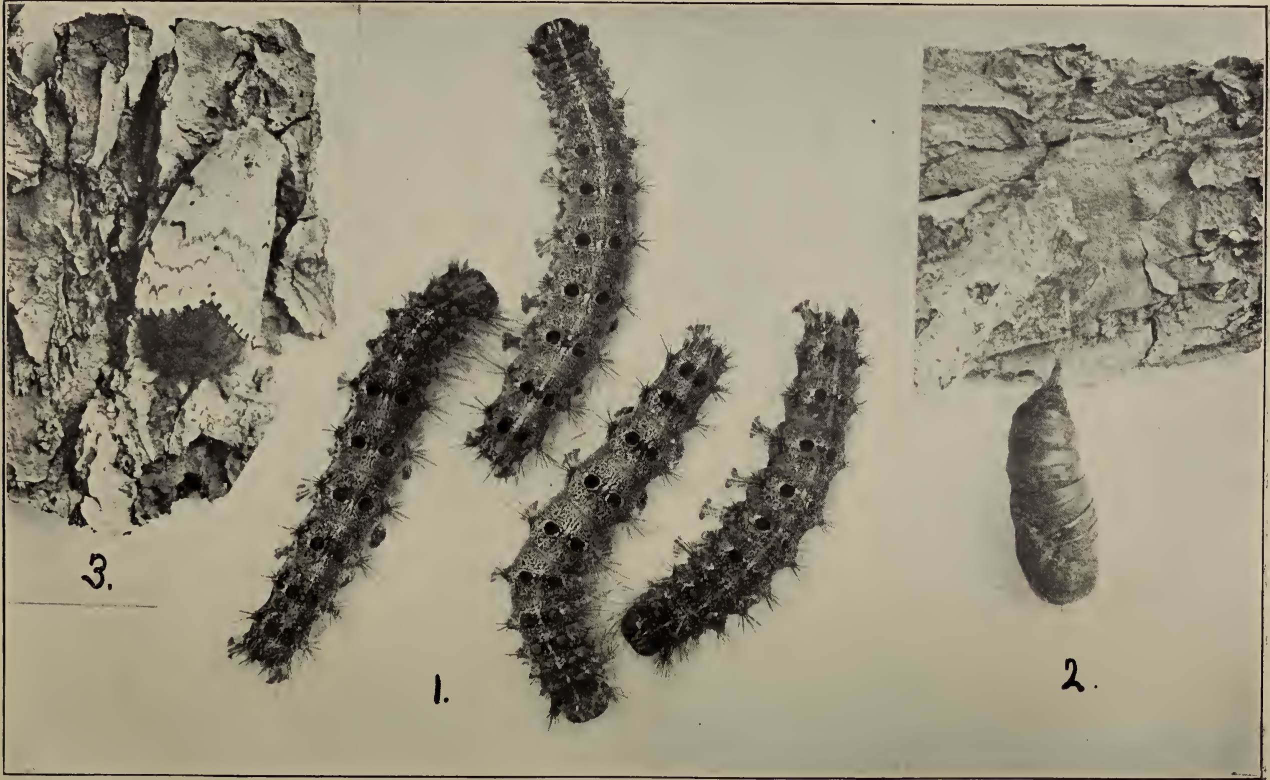

Plate I.—The Gypsy Moth. 1. Caterpillars. 2. Pupa. 3. Female Moth Laying Eggs.

# A Brief Report on the Work Done by the State Board of Agriculture in Suppressing the Gypsy and Brown-Tail Moths, the San Jose Scale, and the Elm Beetle, in Rhode Island.

## THE GYPSY MOTH WORK.

### Early History and Present Status of the Insect.

The gypsy moth was brought into this country by Leopold Trouvelot, a French Scientist attached to the Department of Astronomy at Harvard University. His object was to test a theory which he had that by crossing what he knew to be an extremely hardy insect, the gypsy moth, on the American silk worm, he might in some way produce a hardy, disease-resistant, silk-producing insect. While he was experimenting, the gypsy moths which he had escaped in some way and he was unable to recapture them. He published the fact widely in entomological literature, but no one seemed to take any special notice of it at the time. Twenty years later, the insect had increased to such an extent that its depredations aroused public attention. Individuals fought it for a year or two without success, and, finally, an appeal was made to the Legislature of Massachusetts for funds with which to conduct a campaign of extermination.

The work was begun, and it was found that the insect had spread a great deal more than was at first supposed. A thorough campaign was carried on for nearly ten years, at the end of which period the insect had been so far reduced in numbers that the men in charge of the work were unable to convince the Committee appointed by the Legislature to investigate the progress of the work, that it was necessary to continue the campaign. Appropriations were stopped, and for five years the few remaining insects were permitted to propagate without hindrance. In 1905, they had increased to such an extent that people again called loudly for State help. Appropriations were again made, but when the work was resumed, it was found that the insect had not only increased in the old territory, but had spread over five times as large an area.

Since that year, Massachusetts has been making annual appropriations of increasing magnitude, until last year the direct State appropriation amounted to about $300,000. In addition, cities and towns are required to supply funds, and the total expenditures last year in Massachusetts, including those made by the United States Department of Agriculture, as currently reported, amounted to about $1,000,000.

Within recent years the insect has also been found in Maine, New Hampshire, Connecticut, and Rhode Island. In Maine, the southwestern counties are lightly infested, and the State and the National Government are conducting an effective campaign of suppression. In New Hampshire, the southeastern portion is quite badly infested, and owing to the lack of funds, attempts at suppression have not been wholly successful. Connecticut has had until last year only about one square mile of infested territory located near Stonington. The State has had an emergency fund of $10,000 on hand, which could be used for the suppression of serious outbreaks of insects, and this has enabled them, with the help of the United States Department of Agriculture, to take effective measures, and at the present time the original Stonington territory is practically exterminated. Last year another colony was found at Wallingford, but the area of this also is restricted, and the thorough measures which the State has been able to carry out have resulted in almost a complete extermination in this territory also.

In Rhode Island the insect was first discovered in 1901. It had probably been present in the State a year or two at least before that time. The first appropriation of $5,100 for combating the insect was made in 1906. An inspection of the territory revealed that nearly twenty-five square miles were infested, and the amount of the appropriation was, of course, altogether too small to do effective work. Fortunately, a small National appropriation became available about that time, and through co-operation with the National Department of Agriculture, the insect was materially reduced in numbers. Since that time, the State has appropriated from $7,000 to $9,000 a year, and with the continued help and approximately the same amount of money from the United States Government, the insect has been effectively suppressed, as indicated by the fact that during the first year's campaign 79,000 egg clusters were found and destroyed, and last year and this year, 1,164 and 1,343 respectively. The entire territory is now in excellent condition. We believe that the original infestation in Pawtucket has been exterminated entirely, since we have found no trace of the insect there for two years. The infestation in East Providence has been reduced until scarcely any trace of the insect has been found for two years. A number of small new colonies—probably escaped from Massachusetts—in the northeastern part of the State have been exterminated. On the other hand, we have some new territory in the northern part of Providence, and a number of new colonies were found again this year on the northern border of the State near Woonsocket. The total area, therefore, which we have to keep under surveillance is about the same as that originally infested.

### Life History of the Insect.

Like all Lepidoptera, the gypsy moth has four stages, namely, egg, larva or caterpillar, pupa or resting stage, and adult or imago stage. Eggs are laid by the female moth late in July, through August, and during the early part of September. This stage lasts throughout the winter until warm weather sets in the following spring. About May first, the time depending somewhat upon the condition of the weather, the eggs hatch, and the caterpillars at once begin to feed on the foliage of the trees. The pupa stage begins about the 20th of June, and tardy caterpillars may be found pupating the last part of July. The pupa or resting stage lasts only about two or three weeks. The female moth has wings but seldom uses them, except to break its fall when dislodged from a position some distance from the ground.

### Methods of Combating the Insect.

As with all work in economic entomology, methods of suppression or extermination are based on the life history of the insect. Roughly speaking, the work may be divided into two parts: fall, winter, and spring cleaning work, and summer or burlap work.

### CLEANING WORK.

This consists in destroying the egg clusters by painting them with creosote and putting the territory into such shape that subsequent work, both burlap and cleaning, may be rendered most effective.

The eggs are seldom, if ever, laid on the ground, but almost anything else may form a resting place for the cluster. For instance, we find them on various objects, from tin cans, old shoes, bits of carpet, old umbrellas, to outbuildings and dwelling houses; and on plants from the blades and stems of grass to the largest oaks and elms. Egg clusters are frequently found on fences, hedges and arbors, and even on clotheslines. It is evident, therefore, that rubbish of all kinds, dilapidated buildings, ill-kept fences, brush, ill-cared-for, badly pruned and hollow trees, present conditions favorable to a successful survival of the insect, in spite of all our efforts; and that the removal of these conditions is favorable to an effective campaign. In the winter, therefore, we endeavor to prune and patch up trees that are worth taking care of, and to cut down the worthless ones, clean up fence corners, and search generally with the most minute thoroughness all objects which cannot be removed or destroyed, and which may have been made the repository of egg clusters by the female gypsy moth. In some cases this necessitates the turning over of piles of cord wood, removing and inspecting the stones in hundreds of yards and stone fence, and even the removal of the roof and siding from buildings that are not well cared for.

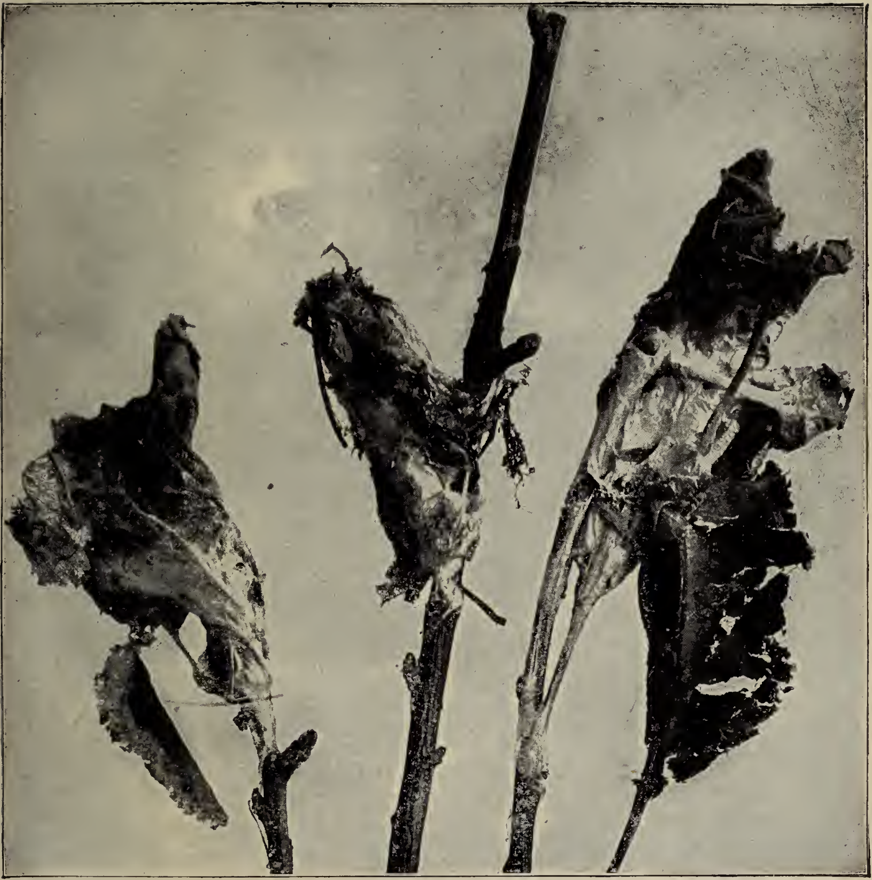

Plate II.—Winter Nests or Hibernacula of Brown Tail Moth.

## BURLAP WORK.

The summer or burlap work is based on the habit of the caterpillar, especially after the first three or four moults, to feed largely during the night, and to seek some hiding place during the day time. If it finds no other hiding place, it will descend to the ground and hide in the grass or rubbish at the base of the tree, where it would be difficult for anyone to find it. An artificial hiding place in the form of a burlap band is therefore provided, and the caterpillar invariably takes advantage of it, unless there are holes in the tree or deep crevices in the bark above the burlap into which it can crawl. After it seeks refuge under the burlap, we know where to find it, and the men make regular inspections as often as possible, and when a caterpillar is found, it is summarily despatched by being cut in two with a knife.

The burlap work is the most expensive of the different methods of work, since it requires a large force of men to turn and make a thorough inspection of the burlaps on from 125,000 to 175,000 trees. In a campaign which has in mind a thorough suppression, and, if possible, extermination, burlapping is very useful. A veteran worker in the early campaign in Massachusetts remarked that if ever the last caterpillar of the gypsy moth in New England were hunted down, he would probably be found under a burlap band.

### LIST OF 1910 LARVÆ INFESTATIONS FOUND UNDER BURLAP BANDS IN PROVIDENCE.

*Total Number of Infestations*, 217.

| STREET OR PLACE. | STREET NUMBER. |
|---|---|
| Alverson Avenue | 92 |
| Atwells Avenue | 760, 866, 938, 961, 948 |
| Admiral Street | 355 |
| Academy Avenue | 170, 182 |
| Andem Street | 73, 88 |
| Alphonso Street | 10 |
| Alto Street | 92 |
| Abbott Street | 93 |
| Allston Street | 123 |
| Alicant Street | 9 |

| STREET OR PLACE. | STREET NUMBER. |
|---|---|
| Blackstone Boulevard | 210 |
| Benedict Street | 91, 105, 110, 406 |
| Bancroft Street | 66 |
| Burrington Street | 51, 59, 70, 75, 85 |
| Burgess Street | 19 |
| Belmont Avenue | 63 |
| Bishop Street | 36 |
| Baker Street | 48 |
| Blundell Street | 25 |
| Butler Hospital | |
| Beaufort Street | 5 |
| Bradley Estate | |
| City Hospital Woods | |
| Calhoun Avenue | 100, 165 |
| Cleveland Avenue | 87 |
| Woods, Cole Avenue | |
| Daniel Avenue | 61 |
| Douglas Avenue | 139 |
| Dover Street | 73 |
| Delaine Street | 165 |
| Duxbury Street | 37 |
| Davis Park | |
| East Transit Street | 183 |
| Eddy Street | 844, 862, 900, 957 |
| Eaton Street | 541, 548, 551 |
| Eighth Street | 38 |
| Erastus Street | 35 |
| House of the Good Shepherd, Eaton | |
| Rhode Island Hospital | |
| Farmington Avenue | 187 |
| Frankfort Street | 21 |
| Faith Street | 54, 37 |
| Florence Street | 110, 114 |
| Fremont Street | 59 |
| Fairview Street | 16 |
| Fairmont Avenue | 20 |
| French School Woods | |
| Grant Street | 80, 91 |
| Queen Dye Works, Giles Place | |

| STREET OR PLACE. | STREET NUMBER. |
|---|---|
| Greenwood Street | 66 |
| Huron Street | 12, 45, 48, 50 |
| Hamburg Avenue | 54 |
| Hyat Street | 70 |
| Helme Street | 33 |
| Hillwood Street | 66 |
| Halsey Street | 22 |
| Howell Street | 84 |
| Hunnewell Avenue | 102 |
| Hartford Avenue | 586 |
| Jewell Street | 14 |
| Judith Street | 15, 62 |
| Julian Street | 117, 128 |
| Joslin Street | 26, 31 |
| John Street | 23 |
| Jefferson Street | 67 |
| Jenkins Street | 60 |
| Kay Street | 16 |
| Kay Dump | |
| Kepler Street | 9 |
| Kimball Street | |
| Laban Street | 92, 226 |
| Laurel Hill Avenue | 140, 297, 324, 333, 365, 367, 366, 398, 469 |
| Liberty Street | 13 |
| Lisbon Street | 11, 41 |
| Meader Street | 18 |
| Maplewood Street | 85 |
| Mount Pleasant Avenue | 7, 11, 122 |
| Merino Street | 44, 70, 106 |
| Main Street, North | 601 |
| Nautical Street | 5 |
| Niantic Avenue | 86, 94 |
| Normal School Grounds | |
| Orchard Avenue | 34 |
| Plainfield Street | 114, 128, 140, 526, 549, 641 |
| Pocasset Avenue | 76, 80, 138, 140 |
| Pratt Street | 12 |
| Pleasant View Avenue | 33, 91 |
| Putnam Street | 63 |

| STREET OR PLACE. | STREET NUMBER. |
|---|---|
| Plain Street | 256 |
| Pavilion Street | 24, 48 |
| Planet Street | 34, 38, 106 |
| Pembroke Avenue | 21 |
| Pemberton Street | 67, 73 |
| Pomona Avenue | 48, 110 |
| Public Street | 604 |
| Regent Avenue | 190, 193 |
| Rochambeau Avenue | 320, 324 |
| Rhodes Street | 220 |
| Rangeley Avenue | 11 |
| Smith Street | 229, 280, 340, 343 |
| Sheldon Street | 12, 103 |
| Seymour Street | 44, 54, 63 |
| Swan Point Cemetery | |
| Sharon Street Farms | |
| Stella Street | 47 |
| Sisson Street | Arboretum |
| Tappan Street | 10 |
| Tuxedo Avenue | 16, 30, 43 |
| Thurbers Avenue | 117 |
| Terrace Avenue | |
| Transit Street | 88 |
| Union Avenue | 339, 358 |
| Van Zandt Street | 34, 91 |
| Valley Street | 53 |
| Whittier Avenue | 221, 222 |
| Webster Avenue | 236 |
| Wallace Street | 166, 170, 240 |
| What Cheer Avenue | 16 |

## List of Nest Infestations in Territory Not Burlapped in Season 1910.

### *Nests Found in Winter of* 1910 *and* 1911 *Cleaning.*

| STREET OR PLACE. | STREET NUMBER. |
|---|---|
| Atwells Avenue | 237 |
| Federal Street | 229 |
| Penn Street | 82 |
| Courtland Street | 14 |
| Ridge Street | 126 |

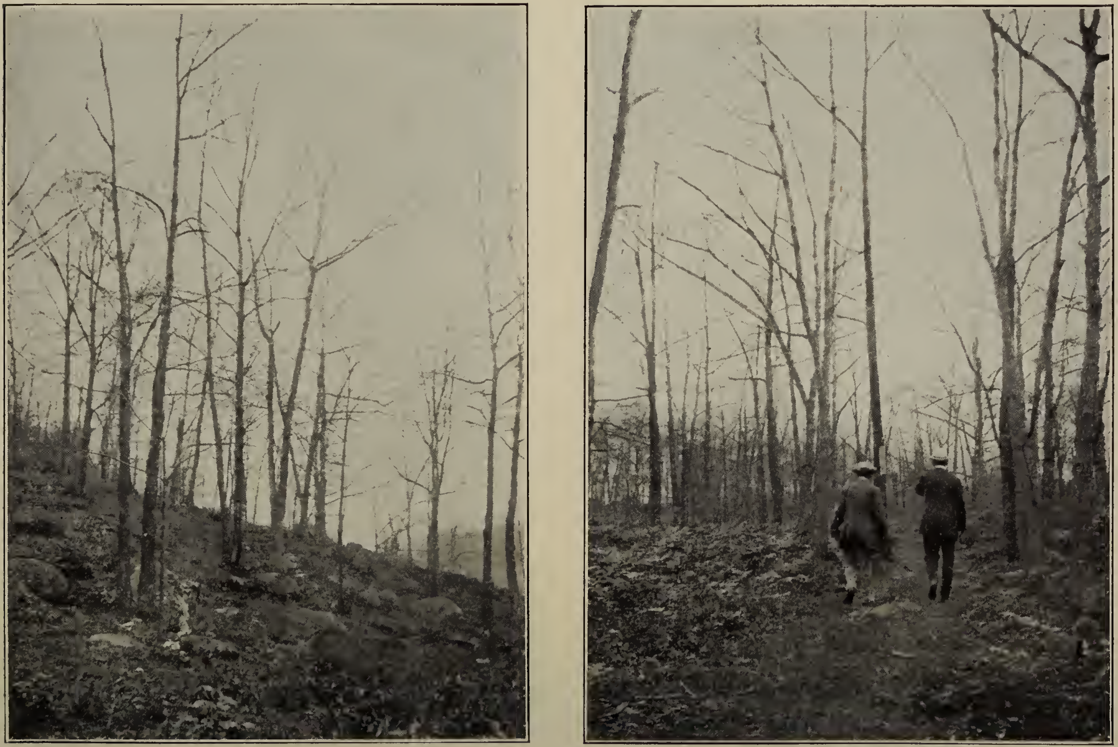

Plate III.—Condition of Woodland in June after the Gypsy Moth got through with its work. Lynn Woods Park, Lynn, Mass.

| STREET OR PLACE. | STREET NUMBER. |
|---|---|
| Eden Street | 21 |
| Broadway | 222, 438, 462, 514 |
| Tobey Street | 82 |
| Westminster Street | 1447, 1466 |
| Spencer Street | 34 |
| Marshall Street | 55 |
| Bell Chapel Grounds, opposite 17 Andrews Street | |
| Dexter Training Grounds | |
| Franklin Street (street trees) | |
| Knight Street | 385 |
| Hammond Street | 56 |
| Division Street | 32 |
| Chapin Avenue | 45 |
| Wendell Street | 47 |
| Lyman Street | 35 |
| Messer Street | 121 |
| Ellery Street | 10 |
| Marvin Street | 7 |
| Cranston Street | 771, 778 |
| Huntington Avenue | 454, 667 |
| Benedict Street | 59, 178 |
| Anthony Avenue | 86, 92 |
| Waldo Street | 214, 243 |
| Wadworth Street | 89, 130 |
| Harrison Street | 192 |
| Linwood Avenue | 223 |
| Ford Street | 119 |
| Grand Street | 40 |
| Chambers Street | 10 |
| Potter Avenue | 705, 821 |
| Puritan Street | 39 |
| Huntington Avenue | 478, 482 |
| Burrington Street | 65 |
| Hamburg Street | 54 |
| Carter Street | 42 |
| Peace Street | 82 |
| Daboll Street | 31 |
| Congress Avenue | 10 |
| Broad Street | 74, 903 |

| STREET OR PLACE. | STREET NUMBER. |
|---|---|
| Lenox Avenue | 225 |
| Elmwood Avenue | 662 |
| Thurbers Avenue | 186, 194, 215, 234, 270 |
| Colfax Street | 14 |
| Gallup Street | 18, 38 |
| Ocean Street | 130, 206 |
| Oxford Street | 309 |
| Briggs Street | 52 |
| Louisa Street | 16 |
| Robinson Street | 48 |
| Langdon Street | 41 |
| Prairie Avenue | 334, 360 |
| Public Street | 306, 376, 382 |
| Chester Avenue | 128 |
| Pearl Street | 220 |
| Claverick Street | 28 |
| W. Clifford Street | 18 |
| Globe Street | 166 |
| Hayward Park | |

## THE BROWN-TAIL MOTH.

### History and Present Status.

The brown-tail moth is also a European insect and was probably introduced into this country on nursery stock sometime after 1890. In 1897 it had increased to such an extent as to cause a great deal of annoyance and damage in and around Somerville, where it first established itself. Since that time it has spread over the entire eastern part of Massachusetts, as far west as the Connecticut river, north through New Hampshire far into the White Mountains, and eastward through the southern half of Maine into Nova Scotia. Its spread south has been less extensive, owing to the fact that the prevailing winds at the time of the flight of the moth are usually from the south or the southwest. It has reached the northeastern corner of Connecticut, and is distributed over the northeastern part of Rhode Island, from Portsmouth on the Island of Newport through Bristol, Cranston, Auburn, Johnston, Smithfield, North Smithfield, and eastward to the Massachusetts line.

### Life History.

Like the gypsy moth, the brown-tail moth has four stages: egg, caterpillar, pupa, and imago. In many respects, however, it differs from the first named insect. The eggs are laid somewhat earlier and hatch within a short time, so that the young caterpillars begin to feed in the fall. Soon after hatching they begin to prepare winter nests of leaves drawn together with silk. These are usually found at the tips of the branches of the trees on which they live. With the approach of cold weather, the caterpillars retire into these winter nests or hibernacula, close up the openings, and remain dormant through the winter season. With the approach of warm weather in the spring, they emerge and begin to feed on the opening buds, and when the leaves come out, they are ready to attack them with full vigor. They attain maturity in June and pupate, and the moths appear the last part of June and the first of July. Eggs are then laid, and the life cycle is completed.

Unlike the gypsy moth, both sexes of the brown-tail fly actively, and for this reason it is practically impossible to check their spread, and all that can be done is to suppress them where they occur.

### Methods of Combatting.

Owing to its different life history and habits, the methods of fighting the brown-tail moth are very much simpler than those employed in combating the gypsy moth. The principal method is cutting off the winter hibernacula which, as stated before, are nearly always at the tips of the topmost branches of the trees. The only requisites for the workmen are good eyes to discover the hibernacula, and the ability to climb all kinds of trees. When cut off, the hibernacula are simply piled up and burned.

In places where the insects occur in large numbers, spraying is resorted to during the summer.

## Food Plants of the Two Insects.

The gypsy moth is a voracious feeder and eats the foliage of almost all kinds of our common trees, from pines and hemlocks to oaks and elms. There are certain kinds which it prefers to others, but careful experiments have determined that there are about five hundred species of plants on which it can live. Evergreens when attacked usually succumb in one year. Other trees may be stripped for two or three seasons before they finally die. It is difficult to realize the damage that the insects can do in orchards and woodlands. Those who have made visits to the infested sections of Massachusetts where the insect has undisputed sway, have found that woodlands have been so completely stripped that their appearance in June is practically the same as in December. Even ferns and other undergrowth will be partly eaten.

The brown-tail moth, on the other hand, is more restricted in its range of food plants. We usually need to look for them only on about a dozen species of trees. The chief objection to the brown-tail is the serious poisoning which results to people from hairs which are shed by the caterpillar during its last two or three stages. These hairs are very minute and are barbed in such a way that when they come in contact with the skin, they work their way into it and cause an intense irritation and poisoning. Cases sufficiently serious to cause death have been reported in two or three instances, and serious illness is often reported from badly infested places. In many instances, people in the infested districts in Massachusetts have been compelled to leave their homes during the caterpillar season on account of the serious menace of this pest.

## Suppressing the Brown-Tail Moth in Rhode Island.

In Rhode Island, efforts have been made to suppress the brown-tail as well as the gypsy moth. The funds, however, have not been sufficient to carry on a thoroughly effective campaign against both pests, and partly as a consequence of this, and partly also as a result of especially favorable climatic conditions during the past two years, the State has now quite a serious infestation of the brown-tail moth. Last summer a number of cases of poisoning were reported, and this winter our men have learned of a number of others which we did not hear of at the time they occurred.

Up to April first, 1911, the workmen employed by the State Board of Agriculture had removed and burned the winter nests from trees in Newport County, in Providence, Pawtucket, Central Falls, and Woonsocket. A closely estimated total of about 147,000 winter nests have been destroyed. There is still considerable territory infested with the insect which we cannot do anything with on account of the lack of funds. The consequence is that there will probably be quite a good deal of complaint on account of the pest next summer, provided climatic conditions are favorable to the propagation of these insects.

I need not repeat that these insects are a serious menace and that they should be kept in suppression. It will be far cheaper to provide funds for a thorough campaign of suppression at this time than it would be to permit the propagation and spread of the insects into woodlands. When a large territory of woodland becomes infested, we shall have to do as the people of Massachusetts have been compelled to do, namely, abandon the woodlands altogether, and simply strive to reduce the damage to a minimum in the cities and more thickly settled portions of the State. It is perhaps needless to suggest further that the loss which such a policy will occasion will be far greater than the money which it is now necessary to expend in order to keep at least the gypsy moth under suppression.

I should add perhaps that if the brown-tail moth has an opportunity to propagate this summer in the territory which has not been been cleaned, the chances for a satisfactory suppression will be greatly decreased, unless a considerably larger sum of money is appropriated than now asked for by the Board of Agriculture.

## Tabular Statement of the Gypsy and Brown-Tail Moth Work.

### ON GYPSY MOTH WORK.

Number of men employed:

Week ending May 13, 1910, 9 men.
Week ending May 21, 1910, 13 men.
From May 21 to June 25, 1910, 16 to 19 men.
From June 25 to August 20, 1910, 29 to 32 men.

The men were then all laid off until the first of September, after which they were paid entirely from the United States funds.

The wages during this period were $2.00 for the inspectors and $1.76 for the other men, except for new men, who had $1.60 until they became reasonably proficient.

### ON BROWN-TAIL MOTH WORK.

Number of men employed:

Week ending November 19, 6 men.
Week ending November 26, 10 men.
From November 26 to February 18, from 14 to 17 men.
From February 18 to March 4, 11 men.
From March 4 to March 18, 8 men.

The wages paid were somewhat higher than for the gypsy moth work, since the labor is much more strenuous and dangerous. It is also difficult to get men who are willing to climb to the top of tall trees without paying a comparatively high price for their work. Inspectors are paid $2.56 per day, and the men $2.00 per day.

### RESULTS OF THE WORK.

The following is a tabular statement of the work accomplished by the gypsy moth force. It includes the work done by the men while paid by the government as well as when paid by the State.

Expenditure, $7,222.81. (This includes money expended for both brown-tail and gypsy moth from January 1, 1910 to January 1, 1911.)

Burlap used, number of yards, 18,003.

Trees burlapped, 110,000.

Men employed during inspection, 70 (including U. S. government men).

Complete inspections, 12, with semi-weekly in badly infested places.

Larvae found, approximate number, 11,111

Pupae found, approximate number, 2,780.

Egg clusters found, 2,126.

Shrubbery and brush cut, square yards, 50,820.

Ground burned over with crude oil, square yards, 55,660.

Stonewalls burned over with crude oil, square yards, 300.

Trees cut down, 208.

Trees trimmed and scraped, 287.

Cavities covered with zinc patches or tarred burlap, 144.

### Expenditures under the Gypsy and Brown-Tail Moth Fund.

From January 1, 1910 to January 1, 1911.

| | |
|---|---|
| Labor | $5,030 43 |
| Burlap | 700 11 |
| Twine | 71 46 |
| Paint, crude oil, etc | 13 17 |
| Tools and miscellaneous supplies | 111 18 |
| Developing and printing photographs | 25 67 |
| Spray outfit | 40 98 |
| Office expenses, including stenographer and office supplies | 312 66 |
| Storeroom | 204 69 |
| Freight, express, and cartage | 82 93 |
| Repairs, ladders, carts, tools, etc | 16 07 |
| Sundry expenses (traveling expenses, Mr. Williams and of the foreman and men in clearing outside colonies. | 113 48 |
| A. E. Stene, salary and traveling expenses | 937 53 |
| | $7,660 36 |

# On the Gypsy and Brown-Tail Moth Situation.

A. E. STENE.

During the past few months there has been a fresh revival of interest in insect diseases and parasitism, stimulated by occasional notes in the newspapers which seem to indicate that the difficulties experienced through the presence of the gypsy and brown-tail moths were soon to be relieved by the operations of effective parasites or fungous diseases. Notes in regard to the discovery of new diseases and parasites have seemed to spring forth more abundantly than usual, stimulated perhaps by considerable discussion in the Massachusetts Legislature regarding appropriations for future gypsy moth work, and by the vetoing of resolutions providing funds for carrying on the work in Rhode Island.

People usually find out how much such items are worth, if time be given, but these stories are particularly pernicious at this time in this State, when no State appropriations are available, because they may lull people into a sense of security and prevent them from doing what they can as individuals to stop the spread of the pests.

It should be stated at the outset that no one will deny the possible value of insect parasitism or diseases in the control of our injurious insects, but it should be known that scientists who are carefully studying the problem have no such unbounded faith in the immediate relief from the parasites that they are working with as some newspaper articles seem to indicate. The work that is being done by the United States Government and by the State of Massachusetts in endeavoring to import and disseminate parasites and diseases which will serve to keep the brown-tail and gypsy moths in check is an admirable one and deserves every support and encouragement. It is the ultimate remedy which we must look to for assistance in an economical control of both of these pests. If the work is adequately

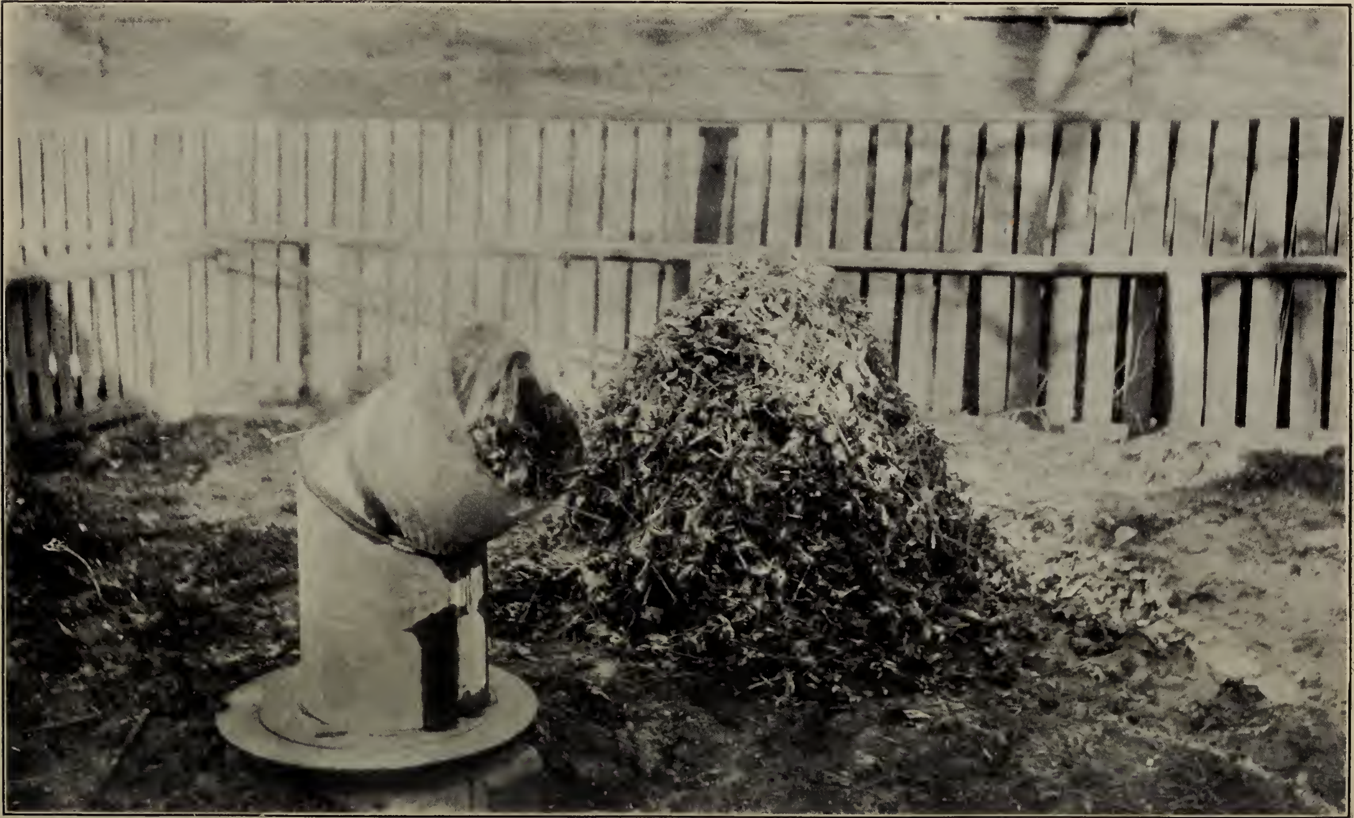

Plate IV.—A few of the Brown-tail Winter Nests (about 10,000, and the Home of 3,000,000 Caterpillars) Collected in Pawtucket.

supported and continued long enough, it will sooner or later be successful, but we must not, under the present conditions, assume that it will be immediately successful and that, therefore, money expended in control by methods heretofore used is wasted.

The history of the artificial introduction of parasites and diseases of notably injurious insects supports this conclusion. Those who wish to conjure with the possibilities of this means of control point to the successful extermination of the fluted scale in California through the introduction of a predaceous enemy from Australia. Other instances where good results have followed could be mentioned, but there are more instances where attempts have ended in failure. Among these may be mentioned the attempt to control or exterminate the San Jose Scale through the introduction of the Asiatic lady bird. This was a failure. So also has been, in great part at least, the attempt to control the cotton boll weevil through the introduction of the Guatemalan ant, or to control the chinch bug of the West through the dissemination of an insect disease. Even if parasites are discovered, their maintenance, propagation, and dissemination where they will do the most good, may entail an expense which would be equal to or greater than that which Rhode Island is at present sustaining in controlling the insects under discussion.

A policy of discontinuing present effective methods to wait for the theoretical possibility that the moths may be controlled by parasites or diseases, is, so far as Rhode Island is concerned, certainly penny wise and pound foolish.

A statement was made in a newspaper article sometime ago that if left alone, the insects would increase to an enormous extent, starvation would ensue, followed by the development of disease and the introduction of parasitic enemies. This is a natural law which is in the main true, and yet the condition which the writer of this newspaper article advocates obtains in Massachusetts at the present day without any permanent relief. Thousands of acres of woodland have absolutely nothing done for them by either State or National authorities, because the funds for carrying on the work are not sufficient, and the pests increase at their own sweet will. The result is that many of the insects do starve to death or become subject to disease, but many survive and scatter to neighboring woodlands in search of food. These lay eggs, and the following year, while the old territory may sometimes be only slightly infested, —more often it is just as badly infested as before,—the trees in the new territory are completely stripped. This is the history, at least so far as the gypsy moth is concerned. It is an extremely hardy insect and not subject to any great extent to inroads of disease or attacks of parasites, except when greatly weakened by starvation. In this natural process, too, thousands of acres of woodland are destroyed, and the annual loss to Massachusetts is probably greater than the cost of any two years' work while the insect was under suppression during the first campaign.

If this theory were accepted for the State of Rhode Island, and if we can judge by the past history of the gypsy moth in this country, the financial loss would be far greater than has been the cost of the whole campaign of suppression up to the present date.

The life history of the brown-tail moth makes it more subject to disease than the gypsy moth, but even this insect will maintain itself as an almost intolerable scourge in the infested districts, unless mechanical methods of suppression be utilized during certain years favorable to the insect.

The situation maintained by the foremost entomologists of the country today, including Dr. Howard of Washington, is that the best and most economical method of dealing with the pests is to suppress them so far as possible and to confine them to the present infested area. Meanwhile, every effort should be exerted towards finding effective natural checks. This proposition is supported by the fact that while the United States Bureau of Entomology spends $250,000 a year fighting the moths, hardly more than 5 per cent of this goes towards the work on parasitic enemies and diseases. The same is true of the Massachusetts state work. Connecticut is bending every effort towards exterminating all colonies which are found within its borders, and that state appropriates sufficient money, so that the effort seems to be successful. Maine is waging a successful campaign along the same line. New Hampshire is giving less attention to the problem, and the moths are rapidly increasing. New York, while not as yet infested by either of the pests, so far as is known, last year appropriated $50,000 to be used by its entomological department for preventing their introduction.

The American Association of Economic Entomologists, composed of the foremost entomologists of the country, has given careful consideration to the problem under discussion and has repeatedly passed resolutions urging that the work of suppression be continued without abatement in order to prevent a spread into other states, thereby entailing enormous losses, until such a time as effective natural checks can be found.

The Massachusetts authorities have sought the advice of the best entomologists, not only of this country but also from abroad, and after a careful consideration of the problem, these have, without a dissenting voice, advocated present methods until natural checks to the pests can be found.

The fact is that in Europe, where both of the insects are natives and where a balance is established, so far as nature can develop it, foresters and fruit growers frequently have to resort to artificial means of control when the insects become unusually abundant.

So far as we can foresee, especially for Rhode Island, where complete suppression has been maintained, the most economical method of handling the problem is to continue the campaign of suppression, so far as possible, through the co-operation of the National Government, the State, and individuals. Even if the danger of spread were not increased, the damage done in the territory now infested, by an unrestricted propagation of the pests, would amount to a very much larger sum than is at present expended, and when we consider what would be the result, should the insects be permitted to spread over and ravage the entire State, it would seem that every citizen should advocate the continuance of the work, because it insures, at least so far as the gypsy moth is concerned: 1. That there will be little, if any, spread. 2. That trees in the infested territory will be protected from defoliation and destruction, and 3. That the large section of the State not now infested will be saved the great expense which will be necessary for even a partial control, should the insect spread beyond the confines of present territory.

The brown-tail moth can not be so readily controlled, yet its spread can be materially checked and the damage and the discomfort occasioned by its presence in the more thickly settled parts of the State reduced to a minimum.

PLATE V.—An Elm Well Cared for and Sprayed. *Photo. by Loveland.*

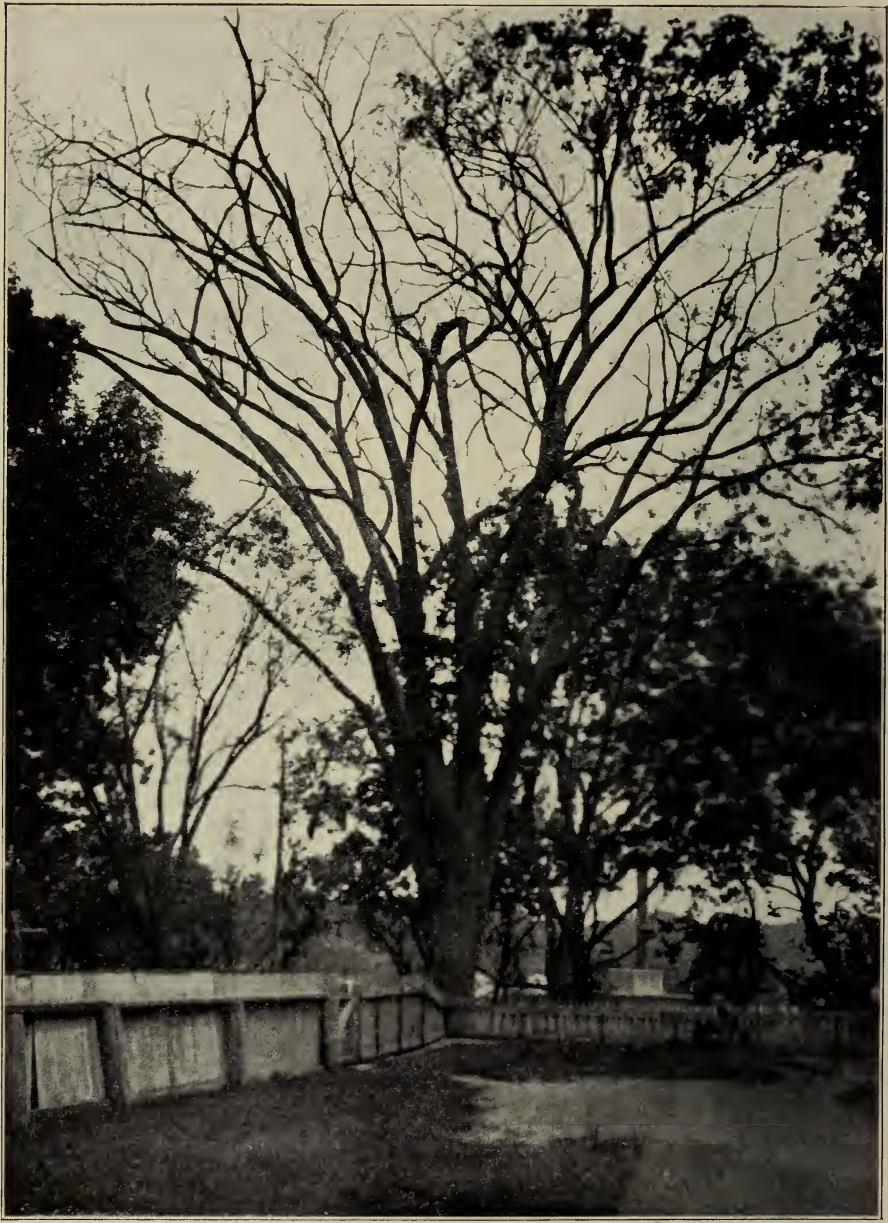

Plate VI.—A Magnificent Elm Destroyed by Elm Beetle. *Photo. by Loveland.*

## THE ELM LEAF BEETLE WORK.

The State for the past two years has provided the Board of Agriculture with a small fund with which to encourage the different localities in the State to protect their elms against the ravages of the elm leaf beetle.

It would take too much space to enter into a description of the insect and its life history. Suffice it to say, that the beetle was introduced from Europe about seventy-five years ago. It has spread over the entire eastern part of the United States, and has done a great deal of damage to elms in the infested districts.

The purpose of the Board of Agriculture has been to encourage the different localities by coöperating with them, furnishing spray material, and wherever necessary, a spray outfit. We have on hand for this work three small, gasoline power sprayers which last year were used in Newport, Bristol, and Washington counties. We have had urgent calls from other sections of the State for effective apparatus of this kind, and we need especially a thoroughly up-to-day sprayer for Providence county. The kind of sprayer which we believe will be most efficient will be discussed later. We also have six barrel and tank sprayers which can be used where the towns cannot themselves supply more powerful apparatus.

The Board of Agriculture coöperated last year with the following places: Bristol, Chepachet, North Scituate, Barrington, Woonsocket, Pawtucket, Providence, Warren, Cranston, Slatersville, South Kingstown, and in cities and towns in Newport county. The trees on the grounds of the State Home and School were also sprayed. A total of approximately 9,000 pounds of arsenate of lead was used, and between 17,000 and 18,000 trees were sprayed. Nearly all these localities have a large number of fine elms, which, unless something is done to protect them from the ravages of the beetle, will eventually succumb to the attacks of the insect. These are by no means all the places in the State which should take some action against the pest. It would be easy to name a dozen or more villages in the State which have splendid avenues of elm trees already more or less injured or totally destroyed by the pest. Efforts were made to establish co-operative arrangements with a number of these towns, but the town authorities neglected to take the necessary steps to provide funds for such work.

It should not be the policy of the State to step into these different localities and do all the work required to protect the trees, but it would seem that the State could well afford to expend a small amount of money towards encouraging these different localities to make some effort to protect their trees, through the use of up-to-date apparatus and methods.

In connection with the entomological work in Massachusetts, it has been found that a sprayer sufficiently powerful so that the stream can be thrown to the tops of the highest trees without climbing is much more economical. Figures have been sent me by the United States Department of Agriculture from its gypsy moth work showing that trees ordinarily sprayed at a cost of about 75 cents per tree with the low power sprayers which necessitated climbing the trees in order to reach the topmost branches, can be sprayed at a cost of 17 to 20 cents per tree with the high power sprayers. It seems to me that it is pre-eminently the province of the State in a matter of this kind to demonstrate the use of the very best methods and apparatus, and we should, therefore, have one of these high power sprayers for demonstration purposes in connection with this work. It is for this reason that a somewhat larger appropriation is asked for this year. We believe that it will pay for itself in better results very quickly.

## THE SAN JOSE SCALE WORK.

The San Jose Scale is so well known and has been described so fully in other reports of the Board that it is hardly necessary to repeat the information already given. The damage that it has done is also well known, and with the increased interest in fruit growing at the present time, there is also an increased interest in this arch enemy of fruit trees.

The policy of the Board of Agriculture in dealing with this pest has been the same as in dealing with the elm leaf beetle, namely, to help the fruit growers to help themselves. To this end, we have used the barrel and tank pumps and other spraying apparatus already mentioned in connection with the elm leaf beetle work in giving demonstrations in various parts of the State. The aim of these demonstrations has been to inform the people of the best kinds of apparatus and accessories, the best spray materials, and how these spray materials should be applied to the trees. As a result, there has been a decided awakening among the people of the State, and I have been creditably informed by dealers in spray supplies that they have sold more up-to-date spraying apparatus the last year or two than they have sold for ten years previous. The demand for spray material has also increased in proportion. Fruit growers are taking on new courage and no longer hesitate to plant trees for fear that they cannot control the San Jose Scale. Fruit growing has a decidedly upward tendency.

As another evidence of the good resulting from the spraying work, may be mentioned the fact that at the Newport County Fair, where the writer has judged fruit for the last four years, the fruit exhibit last fall showed scarcely a trace of the San Jose Scale, while during previous years, a large number of otherwise well-grown fruit failed to win prizes for the reason that it was badly infested with the scale.

We believe that no money that the State has expended has given such profitable results as that which has been devoted to the work of showing the fruit growers how to prevent damage done to their orchards by this pest. In 1909, the State produced less than half of the fruit consumed within the State. We have plenty of land which can be used until our present fruit growing area is doubled, and the money so far expended against the San Jose scale will be a very small percentage of the increased value possible from a complete development of this industry; to say nothing of the pride which we should have in growing here at home a sufficient amount of as good fruit as is grown anywhere to supply our own population. We can with profit increase our fruit growing even beyond the requirements of home consumption, since we are located much nearer to foreign markets than the sections which now produce the bulk of exported fruit.

The work already begun should be continued until we have had a demonstration in every section of the State, and until every fruit grower is fully conversant with up-to-date methods in spraying.

Respectfully submitted,

A. E. STENE.

State of Rhode Island and Providence Plantations.

## STATE BOARD OF AGRICULTURE.

JOHN J. DUNN, Secretary.

# ENTOMOLOGICAL DEPARTMENT.

A. EDWARD STENE, Entomologist.

Not a Rhode Island Apiary but one worthy of consideration by Rhode Island Bee keepers.

# BEE KEEPING IN RHODE ISLAND.

ARTHUR C. MILLER.

Abstract from Report of State Board of Agriculture for 1910.

PROVIDENCE:
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1911.

# BEE KEEPING IN RHODE ISLAND.

ARTHUR C. MILLER.

## IS RHODE ISLAND ADAPTED TO BEE KEEPING?

Bee keeping as a profitable pursuit in connection with some other business, or as an exclusive vocation is just beginning to assume its proper place in the industries of the State.

Investigations of the honey-producing possibilities of Rhode Island have shown that in yield per colony and quality of the honey it ranks well with other northern states. Many parts of the State are particularly good for bee keeping, and only those parts most fully covered with woods and brush are unfavorable.

### THE PRINCIPAL SOURCES OF HONEY ARE:

*First.*—Blossoms of the fruit-bearing trees and shrubs, such as apple, cherry, pear, blueberries, raspberries, etc., together giving a light colored honey of fine flavor and body.

*Second:*—White and alsike clover, and in some sections locust. Honey from these sources is of the highest grade.

*Third:*—The sumachs, clethra, clematis, the European linden, where found, and occasionally, in some places, clover. All of these sources yield honey of good quality, although that from clethra is rather too spicy to please all palates.

*Fourth:*—The goldenrods and asters, which yield a fine aromatic honey.

### COST OF EQUIPMENT. LABOR REQUIRED.

The investment per colony need not exceed ten dollars for the first one or two, and thereafter only the hives need be bought. The average yield per colony under fair management is fifty pounds, while individual colony yields have gone above three hundred pounds. The wholesale prices range from ten cents to eighteen cents per pound, varying with quality and package, and the retail prices are from fifteen cents to thirty cents.

Modern methods of management have overcome many of the seeming annoyances of the past, and the labor involved is slight as compared with what is necessary for any other live stock.

### The Market's Demand for Honey.

The Rhode Island market for honey is very good but it is at present supplied largely from without the State. Climatic conditions are favorable for bee culture, and there seems to be no good reason why it should not be undertaken by many more persons than are now engaged in it. A few persons are already extending their apiaries, looking forward to bee keeping as an exclusive business.

### Bee Keeping and Orcharding.

The orchardists are beginning to realize the importance of having bees in or near their orchards, and are either buying bees or offering inducements to bee keepers to move bees to their vicinity.

### Difficulties in Bee Keeping.

Some bee keepers are not getting the returns they might from their bees, and the greenhouse and fruit men often find the keeping up of the necessary stock of bees no small expense. These results are due chiefly to incomplete knowledge as to the proper care of bees and partly to losses caused by diseases.

### Control of Bee Diseases.

At the present time there seems to be no contagious diseases of bees within the State, though such exist close to the northern and western border. Reasonable care should hinder their introduction and prompt action prevent their spread, should they obtain a foot-hold. Under the existing law, copied in full below, for the control of bee diseases, an inspector is appointed to aid bee keepers in the eradication of the diseases if found among their bees or bees in their vicinity, and to give such suggestions as he may deem advisable.

### AN ACT PROVIDING FOR THE INSPECTION OF APIARIES AND THE SUPPRESSION OF CONTAGIOUS DISEASES AMONG BEES.

*It is enacted by the General Assembly as follows:*

SECTION 1. The state board of agriculture is hereby authorized to appoint some qualified person to be state inspector of apiaries, and he is empowered to appoint one or more assistants as needed, who shall carry on the work under his supervision.

SEC. 2. The inspector or his assistant shall at his option or when notified in writing by the owner of an apiary, or by any three disinterested taxpayers, examine all reported apiaries, and all others in the same locality not reported, and ascertain whether or not the diseases known as American foul brood or European foul brood, or any other disease which is infectious or contagious in its nature, and injurious to honey bees in their egg, larval, pupal, or adult stage, exists in such apiaries; and if satisfied of the existence of any such diseases he shall give the owners or care-takers of the diseased apiaries full instructions how to treat such cases, as, in the inspector's judgment, seem best.

SEC. 3. The inspector or his assistant shall visit all diseased apiaries a second time, after ten days, and, if need be, burn all colonies of bees that he may find not cured of such disease, and all honey and appliances which would spread disease, without recompense to the owner, lessee, or agent thereof.

SEC. 4. If the owner of an apiary, honey, or appliances, wherein disease exists, shall sell, barter, or give away, or move without the consent of the inspector any diseased bees (be they queens or workers) colonies, honey, or appliances, or expose other bees to the danger of such disease, or fail to notify the inspector of the existence of such disease, said owner shall, on conviction, be liable to a fine of not less than ten dollars nor more than one hundred dollars.

Sec. 5. For the enforcement of the provisions of this act, the state inspector of apiaries or his duly authorized assistants shall have access, ingress, or egress to all apiaries or places where bees are kept; and any person or persons who shall resist, impede, or hinder in any way the inspector of apiaries in the discharge of his duties under the provisions of this act shall on conviction be fined not less than ten nor more than one hundred dollars for each offence.

Sec. 6. After inspecting infected hives or fixtures or handling diseased bees, the inspector or his assistant shall, before leaving the premises or proceeding to any other apiary, thoroughly disinfect any portion of his person and clothing and any tools or appliances used by him which have come in contact with infected material, and shall see that any assistant or assistants with him have likewise thoroughly disinfected their persons and clothing and any tools and implements used by them.

Sec. 7. It shall be the duty of any person in the State of Rhode Island engaged in the rearing of queen-bees for sale, to use honey in the making of candy for use in mailing-cages, which has been boiled for at least thirty minutes. Any such person engaged in the rearing of queen-bees shall have his queen-rearing apiary or apiaries inspected at least twice during each summer season; and on the discovery of the existence of any disease which is infectious or contagious in its nature, and injurious to bees in their egg, larval, pupal, or adult stage, said person shall at once cease to ship queen-bees from such diseased apiary until the inspector of apiaries shall declare the said apiary free from all disease. On complaint of the inspector of apiaries, or of any five bee keepers in the state, that said bee keeper engaged in the rearing of queens is violating the provisions of this section, he shall, on conviction, be liable to a fine of not less than twenty-five nor more than one hundred and fifty dollars.

Sec. 8. The inspector of apiaries shall make annual reports to the state board of agriculture giving the number of apiaries visited, the number of diseased apiaries found, the number of colonies treated, also the number of colonies destroyed, and the expense incurred in the performance of his duty. He shall also keep a careful record of the localities where disease exists; but this record shall not be public, but can be consulted with the consent of the inspector of apiaries.

SEC. 9. All fines collected under the provisions of this act shall be paid to the state treasurer, and by him added to the appropriation of the state board of agriculture, to be used in carrying out the provisions of this act.

SEC. 10. All acts or parts of acts inconsistent herewith are hereby repealed, and this act shall take effect June first, A. D. 1910.

## BEE DISEASES.

There are two contagious diseases of bees now recognized, both of which attack the brood or bees in the larval stage, and are known respectively as American Foul brood and European Foul brood, the latter being sometimes called Black brood. The so-called Pickled brood is seldom met with and does not seem to be infectious. The term foul as applied to brood disease was given on account of the odor emanating from the dead brood.

The following is a description of the diseases mentioned and the general manner of their treatment.

### AMERICAN FOUL BROOD.

The cause of this disease is now known to be a microscopic organism called *Bacillus larvæ*, White. Dr. E. F. Phillips, in charge of apicultural investigations of the U. S. Department of Agriculture describes this disease as follows:

*"When the larvæ are first affected they turn to a light chocolate color and in the advanced stages of decay become darker, resembling roasted coffee in color. Usually the larvæ are attacked at about

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* The Brood Diseases of Bees. By E. F. Phillips, Ph. D. Circular 79, Bureau of Entomology, U. S. Department of Agriculture, pp. 1–2, 1906.

the time of capping, and most of the cells containing infected larvæ are capped. As decay proceeds, these cappings become sunken and perforated, and, as the healthy brood emerges, the comb shows the scattered cells containing larvæ which have died of disease, still capped. The most noticeable characteristic of this infection is the fact that when a small stick is inserted in a larva which has died of the disease, and then slowly removed, the broken-down tissues adhere to it and will often stretch out for several inches before breaking. When the larva dries, it forms a dark brown color, which can best be observed when the comb is held so that a bright light strikes the lower side wall of the cell. Decaying larvæ which have died of this disease have a very characteristic odor, which resembles a poor quality of glue. The disease seldom attacks drone or queen larvæ."

## European Foul Brood.

Dr. Phillips describes this disease as follows:—

"This disease attacks larvæ earlier than does American foul brood, and a comparatively small percentage of the diseased brood is ever capped. The diseased larvæ which are capped over have sunken and perforated cappings. The larvæ when first attacked show a small yellow spot on the body near the head and move uneasily in the cell. When death occurs they turn yellow, then brown, and finally almost black. Decaying larvæ which have died of this disease do not usually stretch out in a long thread when a small stick is inserted and slowly removed. Occasionally there is a very slight "ropiness," but this is never very marked. The thoroughly dried larvæ form irregular scales, which are not strongly adherent to the lower side wall of the cell. There is very little odor from decaying larvæ which have died from this disease, and when an odor is noticeable it is not the "glue-pot" odor of the American foul brood, but more nearly resembles that of soured dead brood. This disease attacks drone and queen larvæ very soon after the colony is infected. It is as a rule much more infectious than American foul brood and spreads more rapidly. On the other hand, it sometimes happens that the disease will disappear of its own accord, a thing which the author never knew to occur in a genuine case of American foul brood. European foul brood is most destructive during the spring and early summer, often almost disappearing in late summer and autumn."

If taken in time, both of these diseases may be controlled without serious loss to the bee-keeper, but if allowed to go unchecked, they will soon ruin any apiary, great or small.

The basis of treatment of both diseases is to deprive the infected colonies of all combs, whether empty or containing brood or honey, the bees being put into a new or thoroughly disinfected hive and allowed to start housekeeping anew. It will be from four to six days before they have any young to feed, and by that time all the honey they had in their honey sacs when taken from their infected hive will be gone, and the young will receive pure food, fresh from the flowers.

Except in fairly large apiaries, it is not worth while trying to save any of the brood from infected colonies. When it is desired to save such brood, it should all be given to one or two diseased colonies and allowed to remain for two or three weeks, after which these colonies should also be treated. In transferring diseased brood it is best to put it above a queen-excluding honeyboard, so that the queen of the colony may not lay eggs in the diseased combs. It is not wise to dequeen such colonies, for colonies without a queen are less likely to keep out robbers, and if robbers gain access to the infected honey, the disease will then appear in the colonies to which they belong. The combs from diseased colonies may be melted and the wax recovered, and wax from such sources appears to be safe to use in foundation making, etc. The refuse from the combs should be *burned.* The honey as a rule is not worth trying to save. It is so difficult to sterilize it, that its return to the bees for food is most unwise. If it is clear and nice, its use as human food is all right, for the microscopic plants are harmless to the human system. But do not let a single drop of it get to the bees.

The frames from diseased colonies may be saved by immersing them for a few minutes in a very strong solution of washing soda that is kept boiling during the operation. As soon as all wax and bee glue (propolis) are dissolved from the frames, they are rinsed in clear water, and after drying are ready for use again. Hive bodies, floors, covers, and other parts may be similarly treated, but usually it is easier to scorch these over with a gasoline torch, or by some similar method.

## Pickled Brood.

The larvæ die just preceding or just after capping and usually present a watery appearance. The cause is not known and the disease does not seem to be infectious.

It is usually treated by requeening, on the assumption that it is congenital.

## Diseases of Adult Bees.

Paralysis is a disease of the adult bee. Its cause is not known and it is not common in the northern states.

Diarrhoea, or dysentery, as it is often called, is more properly a temporary digestive disturbance than a disease. It most frequently follows confinement to the hives for an undue length of time and under unfavorable conditions. Bees maintain the heat necessary for life by the consumption of honey. When the honey is deficient or low in the natural sugars, as when it is thin and unripe, or contains honey dew or an excess of pollen, they have to consume an undue amount to keep up the normal heat, and the system becomes over-loaded with waste matter. Unless the weather permits the bees to fly occasionally, the matter is voided in the hive and the trouble is aggravated.

Leaky or insufficiently ventilated hives will cause the bees extra effort to keep warm and so bring about the trouble, even though the honey is perfect for their purpose. A warm, sunny day will usually cure the trouble, but if combs are badly soiled, it may be necessary to give the bees a clean set of combs and a clean hive and feed them some warm sugar-sirup.

Moderate spotting of hives when bees fly in winter and spring need cause no alarm, but if the trouble seems excessive about any particular hive, it had better be opened and examined.

In case of trouble or suspected disease, bee-keepers are requested to write to the Entomological Department, State Board of Agriculture, State House, Providence, R. I.

The Entomological Department of the State Board of Agriculture has in preparation a bulletin on Modern Bee Culture written especially for Rhode Island conditions by the author of this article, and fully illustrated. When published it will be sent to all who will apply to John J. Dunn, Secretary of the Board of Agriculture, State House, Providence, R. I.

State of Rhode Island and Providence Plantations.

# STATE BOARD OF AGRICULTURE.

JOHN J. DUNN, Secretary.

# Entomological Department.

A. EDWARD STENE, Entomologist.

Part of a Fifty Colony Apiary at Howard, R. I.—*After Providence Journal.*

# HOW TO KEEP BEES.

ARTHUR C. MILLER.

Abstract from Report of State Board of Agriculture for 1910.

PROVIDENCE:
E. L. FREEMAN COMPANY, STATE PRINTERS
1911.

A woman's apiary near Knightsville, R. I.—*After Providence Journal.*

# PREFACE.

Bee keeping as a pastime or hobby is quite extensively practiced in this as well as in other States. Only occasionally, however, do we find persons who enter into it as their principal business, or even as a money-making side line.

There is a good chance for an enlargement of this industry in Rhode Island. The market for good honey is not overstocked. In fact, we could with great advantage to ourselves supplant with honey some of the sweets now consumed, and it is safe to say that were the advantages of honey as a food well and generally known, and were the supply adequate, the number of bee keepers of both kinds, vocational as well as avocational, could be increased many times over without creating a surplus in the market.

From an economic standpoint also bee keeping should be encouraged. Bees gather and store for human consumption a product which is otherwise wholly wasted, and while so doing they render valuable service to the plants by aiding cross fertilization in return for the nectar secured. In the case of fruit trees, this is of immense advantage to the orchardist.

Bees require but little attention, and the outfit necessary for their care and housing is nominal in cost. While, as Mr. Miller states, our thickly forested areas are not adapted to extensive bee keeping, still there is abundant pasturage for a great many times the number of hives which are now in the State. It is therefore to be hoped that we may have in the near future a considerable increase in this industry, and it is the purpose of the Board of Agriculture to foster it so far as lies within its power.

An excellent apiary inspection law has been passed which will aid in checking the spread of bee diseases and in the dissemination of better knowledge in regard to diseases and methods of eradicating them.

A brief bulletin entitled "Bee Keeping in Rhode Island," which deals with the principal bee diseases and their control, has already been issued. The present bulletin on "How to Keep Bees," aims to give a full account of the practice of bee keeping, and the fact that the author is a bee keeper of long experience, who not only knows the practical side, but has also sought the fullest information through other avenues, assures us that the directions presented can be given the fullest credence and can be studied to advantage by every bee keeper, but particularly by beginners who wish a brief and concise treatise relating to the industry.

The Board of Agriculture is indebted to the A. I. Root Company, Medina, Ohio, for all the cuts used in this bulletin, and to A. H. Gurney, of the *Providence Journal*, for the pictures from which halftones were made, showing apiaries at Howard and Knightsville.

A. E. STENE.

# HOW TO KEEP BEES.

ARTHUR C. MILLER,

INSPECTOR OF APIARIES.

## INTRODUCTION.

Rhode Island offers excellent opportunities for profitable bee culture. The soil is diversified, the flora is varied and extensive and the climate is not rigorous. Some of the more densely wooded parts of the State are not adapted to the pursuit as a business, nor even adapted to the support of more than a few colonies here and there. Other parts, particularly those having considerable dairy farming or fruit growing, are well adapted to bee culture on a substantial scale and here and there are locations which compare favorably with the best in the land and will profitably support large apiaries.

In times past bees were to be found on many farms and in many a village yard, but to-day they are far less often met with. The reasons for this condition are many, but probably the most important has been loss or meagre profit due to the lack of information as to the proper care of bees.

To aid in extending bee-keeping in this State and to make it easier and more profitable are the objects of this bulletin.

### PASTURAGE.

Bees may be kept almost anywhere and in almost any sort of a receptacle, but to make them profitable several factors must be considered. The first and most important is the pasturage, for if that is not good, all the skill in the world will avail but little.

The sources of honey in Rhode Island grouped in the order of their appearance are willows, maples, elms and other less numerous trees which furnish the bees with the early supply of pollen and honey so useful and so needful in building up the bee population preparatory to the harvest in which the beekeeper shares.

Next comes the fruit blossoms, peach, plum, cherry, pear, apple, huckleberries and blueberries which, when the spring is favorable, yield good crops of the finest honey. In some places dandelions are an important addition to the fruit bloom, though not always coming at the same time. After the lapse of a week or ten days the main crop of the year comes from the white and alsike clovers. In some parts of the State these are accompanied by a heavy but brief flow of water-white honey from the locust, and are soon followed by chestnut which yields a rich, heavy, but dark honey.

In many sections sumacs furnish the next crop, and where they are abundant the beekeeper may rightly look for a good crop of a very fair honey.

In some of the more swampy and less settled sections, button bush, clethra (sweet pepper bush) and clematis yield a white and highly flavored honey, that from clematis being of the very highest quality. But the yield from these plants seems to be irregular, in some years being almost absent.

In some of the villages and cities the European Lindens are numerous and yield heavily. The bloom comes toward the end of the clover flow, though the time of flowering of different trees in the same neighborhood varies greatly. Native Linden (Basswood) is now found only in a few places. The season closes with the goldenrods and asters which yield a rich aromatic honey, but which is not acceptable to many persons. The crop from these two sources is not always to be depended upon, being more affected by the weather than some of the others.

Many other flowers contribute to the harvest, but seldom to any great extent.

It is important that the bee-keeper should know well the pasturage of his bees and govern himself accordingly. If his crop must depend only on one of the groups, he must needs bend every energy to get that, but if he has two or more to depend on he can vary his plans.

Bees range for food about two miles from home, but the best results are secured when the pasturage is within a mile of the apiary. Bear these facts in mind when seeking the location for an apiary and if already located, make a careful inspection of the country round about and determine the sources of supply.

## LOCATION OF THE HIVES.

The hives should be in a somewhat sheltered place, preferably where they get the morning sun and are shaded in the heat of the day. As the prevailing winds in the State are from the west and southwest, it has been found advantageous to face the hives to the southeast or east. If on flat lands or low lands, by all means raise the hives about a foot from the ground. It puts them above a strata of cold fog which in the night often lies about six or eight inches deep in such places.

Having the hives so raised will be found to be helpful in other ways. They are more convenient to work at, are up out of the grass, weeds and dirt, and where sundry vermin will not disturb them.

Any convenient thing will do to set the hives on, but a stand made of spruce fence-rails after the following design has proved satisfactory in many years of service. The writer prefers a stand which will hold two hives and allow about eight inches between them. (See Figure 1.)

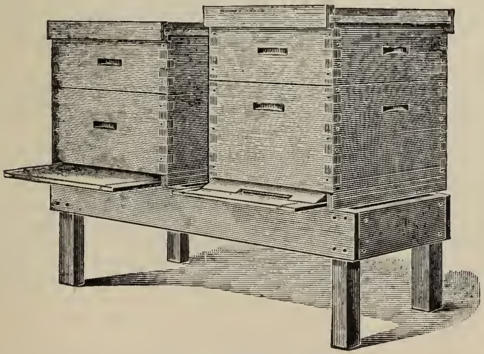


FIG. 1.—Hive Stand.

If the legs are creosoted or limed, or lime or waste from electric batteries is put on the ground where they stand, they last a long time. Battery waste will also kill the grass and weeds.

## HIVES.

Any of the hives commonly offered by the manufacturers of bee-keepers supplies will do, but the more simple they are and the fewer the loose parts, the more satisfactory they will prove in the long run. Perhaps the most universal hive now in use is called the "Dovetailed" hive, named from the manner of its locked corners. (See Figure 2.) The hives known by this name all take the Langstroth frame, which measures 17⅝ by 9⅛ inches outside measure.

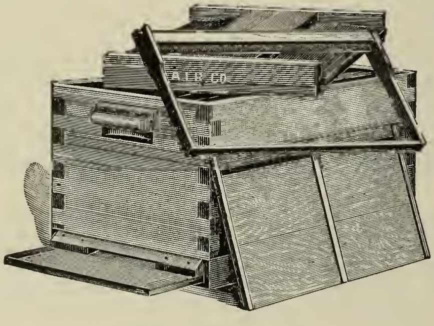


Fig. 2.—Dovetailed Hive.

These hives are commonly furnished in two widths called the eight-frame and the ten-frame. The former has had a great vogue but is now rapidly being discarded for the ten-frame size, and the beginner should be sure to get the latter. The keeper of a few colonies who contemplates increasing should by all means change to the larger size.

The hives having double walls with confined air spaces between or filled with chaff or sawdust are good, but they cost more, are unwieldy, and in many ways less desirable. They are supposed to keep the bees warm in winter and make safer wintering, but as the temperature within the hive and outside of the cluster of bees in winter is practically the same as out of doors, the advantage is imaginary rather than real. During the rest of the year, however, such hives are some help to the bees, but in this climate the advantages are not commensurate with the cost and inconvenience. An outer case answers the same purpose and is more convenient. (See Figure 3).

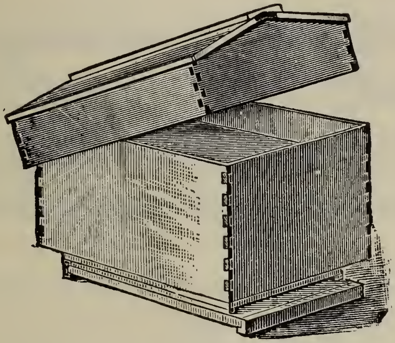


Fig. 3.—Outer Case.

Hives of different sizes and proportions are used and advocated by different persons. They are designed to meet some need of the beekeeper, or are based on some theory of bee habits, but with one exception it is believed they all call for a lot of attention and manipulation at critical times. The average person will do well to avoid them. There is one type of hive, however, which is designed to minimize labor and give average results. It is known as the "Let Alone" hive. The type was originally exploited by Gen. D. L. Adair, in the late '60's, and was then called the "Long Idea" hive. Some few years ago Mr. Allen Latham of Norwich, Conn., experimented with it, and finally developed the present type which he has called the "Let Alone." It is approximately thirty-six inches long, twenty inches wide, and eighteen inches high. In the Adair hive the entrance was in the middle of the long side, in the Latham hive it extends across one end. Mr. Latham had the advantage of an invention which Adair had not, namely, the so-called queen-excluding metal. Also Mr. Latham is a very careful student of bee habits, and with the knowledge acquired in many years' work with the bees, was able to accomplish what had not before been done.

In the Adair hive the queen had the run of all the combs (about twenty); in the Latham hive she is confined to the seven at the front, being kept from the others by a sheet of the queen-excluding metal. (See Figure 4).

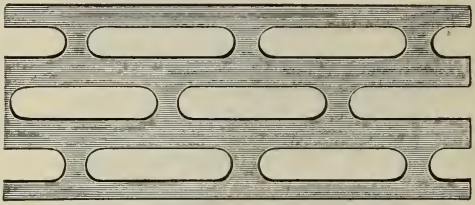


Fig. 4.—Excluder Metal.

These hives are really the tools of a high class specialist and while they will often succeed in the hands of a novice, their continued and uniform success on the minimum of labor plan calls for the knowledge only to be gained by long and careful observation of bees and their ways.

These are special hives which must be made to order. The frames are nearly five inches deeper than the standard Langstroth frame and these frames also have to be made to order. The top bars and end bars of the frames touch the whole length when the frames are in place in the hive, so that the bees can only pass out at the bottom. Beveled cleats are nailed along the lower inside corners of the hive and against these the bottom corners of the frames touch, keeping the bees from going behind the frames and virtually making a box within a box. The tops of the frames are about an inch below the top edge of the hive and Mr. Latham uses a few layers of newspapers and a thin wooden cover on top of the frames. The cover proper has a three inch rim and fits down over the hive. Hive body and cover are covered with heavy waterproof paper, black in color. The entrance which is an inch high, is guarded by a row of fine wire nails driven up through the floor. These are spaced far enough apart to permit the bees to pass freely and yet prevent the ingress of mice.

The bees and queen are started in the frames in the front end of the hive and are thereafter never disturbed unless external appearances indicate something wrong inside. When the bees have the front or brood compartment filled they spread through the excluder metal into the space behind. The frames there have only "starters" of comb foundation as guides for the bees. At the convenience of the beekeeper the honey in these frames is removed and the frames returned.

## FRAMES, SUPERS, ETC.

Frames may be placed in two classes, free hanging and self spacing, and the latter again into hanging and standing. Probably the most extensively used and the best for the beginner are the self spacing frames of the Hoffman type illustrated here. (Figure 5a).

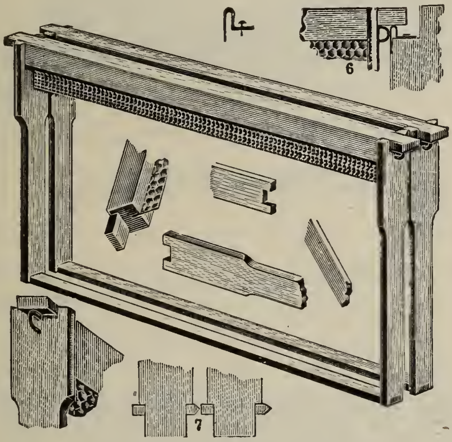


Fig. 5a.—Self-Spacing Frames.

These frames have grooves in the top bar for fixing the comb foundation and holes in the end bars for wires. Fine tinned wire is threaded through these holes, stretched tight and fastened. To these the sheets of foundation are fastened by embedding the wire in the wax. Various devices are sold for the purpose, but any narrow piece of iron with a notch filed in the end will do. The tail

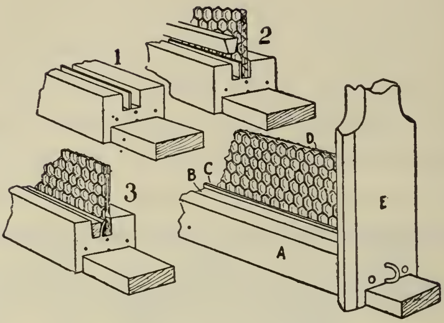


Fig. 5b.—Showing manner of fastening Foundation in Frame.

of an old file is just right. This is kept warm over an oil stove or lamp and is used by drawing the notch along the wire, bearing on just enough to bed the wire without cutting through the sheet of wax. In doing this work the frame is slipped over a board on which the foundation is laid.

It is advisable to wire all brood frames as they may then be handled more readily, and if colonies of bees are shipped any distance, there will be no danger of wired combs breaking down.

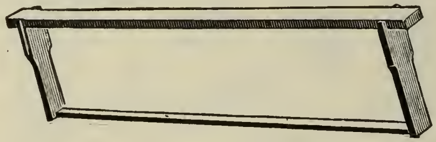


Fig. 6a.—Shallow Extracting Frame.

"Shallow frames" are much like the others except that they are only from 4½ to 5½ inches deep. They are used in shallow chambers

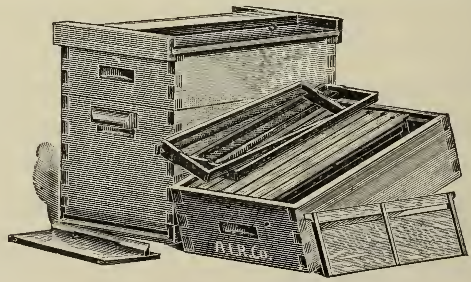


Fig. 6b.—Hive with Shallow Extracting Super.

called supers, and the filled combs are either cut from them or uncapped, and the honey extracted. They are not usually wired. (Figures 6a and 6b).

Arrangements for producing honey in sections are somewhat more complicated. The shallow chamber is much the same as above, but special holders are provided for carrying small boxes or "sections" in which the bees build the combs. Strips of tin or wood separate each row of sections to prevent the bees bulging the surface of the combs. (Figure 7).

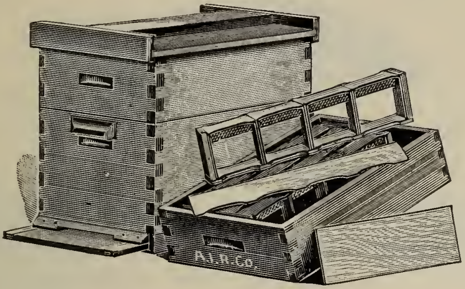


Fig. 7.—Hive with Comb Honey Super.

## HONEY BOARDS.

Honey boards, so-called, are devices for use between the body (brood chamber) of the hive and the surplus compartment (super). The most satisfactory one is made of slats between which are fixed perforated strips of metal or accurately spaced wires to prevent the

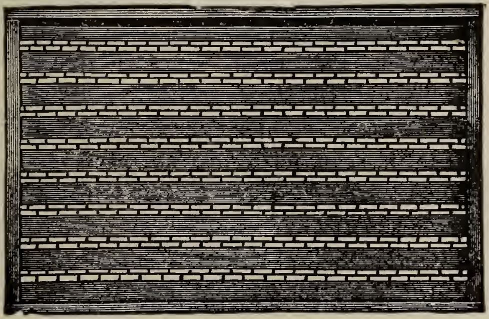


Fig. 8.—Honey Board.

queen passing into the super. There is a rim around the edge so placed as to be flush on one surface and raised on the other, giving a bee space. The bee space side is used uppermost. (Figure 8).

## BEE ESCAPES.

A bee escape is a sort of fly trap device, permitting the passage of the bees in one direction only, and is used in a board placed between the brood chamber and the super to free the super from bees when it is desired to remove the honey. It is a most useful contrivance, but its success depends upon there being no brood in the supers. (Figure 9).

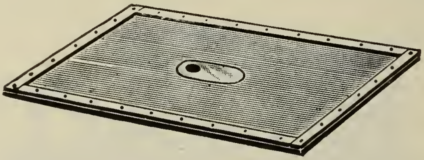


Fig. 9.—Bee Escape in Board.

## DRONE AND QUEEN TRAP.

The drone and queen trap is a two compartment box for use at the hive entrance to catch drones and the queen, if a swarm issues. So far as drones are concerned, it is far better to avoid their presence by having combs built from full sheets of foundation. The few drone cells then constructed around the edges will not produce enough drones to do any harm. As a device for catching the queen when a swarm issues, it is successful, unless the queen chances to be abnormally small.

A word of caution regarding the use of the trap will not be amiss. It calls for attention and thought. It must frequently be freed of drones, else ventilation is obstructed and the colony may suffocate if weather conditions are right or shade is lacking. As a queen trap, it must be looked at every day, or the queen may be caught and perish if too long confined or a storm occurs. Many beekeepers have given up their use.

## SMOKER.

A good smoker is absolutely necessary. Without one it is impossible to readily handle the bees under all the varying conditions to be met with. Get one large enough. One having a barrel three and one-half inches in diameter is a good size, but if many bees are kept, a larger one will be found better. (Figure 10).

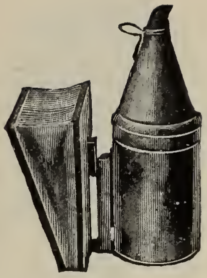


Fig. 10.—Smoker

## FOUNDATION FASTENERS.

If one is using sections, some sort of a device must be used for fastening the foundation in the sections, and any one of the various machines using a heated metal plate will be found satisfactory. For only a few score sections a little melted wax may be used, but for rapid and extended work buy a fastener.

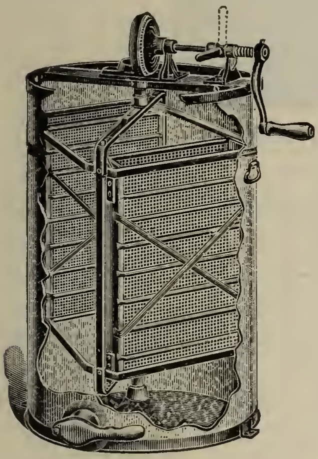


Fig. 11.—Extractor.

## HONEY EXTRACTOR.

For extracted honey an extractor is necessary, and if much work of the kind is to be done, one of the "reversible" type will be found best. (Figure 11).

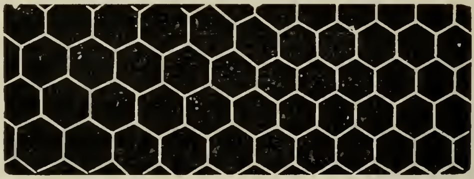
## HIVE TOOLS.

For prying open hives, separating frames, etc., for scraping off wax and propolis, some sort of a tool is needed. A putty knife if fairly stiff is excellent, or one of the special tools sold for the purpose may be obtained.

## COMB FOUNDATION.

Comb foundation is beeswax made into thin sheets run through embossing rolls which give it the shape of the midrib of honey-comb with an outline of the cell walls. It is made in several thicknesses and of worker size cells, drone comb foundation only being furnished on special order. It is one of the devices which the modern beekeeper cannot afford to do without. Drone comb has about four cells to the linear inch, while worker comb has five. (Figure 12).

In brood frames use the lighter grades of "Brood foundation" and wire the frames.



Drone Cells. FIG. 12. Worker Cells.

In sections use the "light super" foundation until skilled in the art. The "extra light" sometimes bothers the novice. Many persons hesitate to use full sheets of foundation in the brood frames, deeming the sixty to seventy cents necessary for each ten frames an extravagance. It is a real economy, and the wise beekeeper will never hesitate to make an expenditure in that line.

## CLOTHING.

A veil for protecting the head from the bees is necessary. It may be purchased ready made or made at home from netting. The part used before the face should be black and preferably of silk tulle. The top may have an elastic cord run around it to slip over the hat crown or it may be sewed to the rim of a hat. Similar veils are made of wire cloth with a "skirt" of cotton cloth attached to the lower edge to tuck under the coat or to tie down. (Figure 13).

Oftentimes the experienced beekeeper works without any veil, but one is always kept at hand in case the bees become irritated or cross.

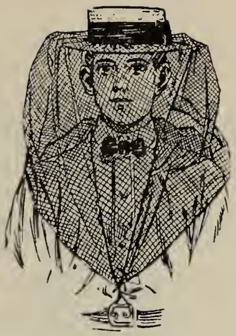


FIG. 13.—Bee Veil.

Short gathered sleeves with elastic band in each end will be found excellent to keep bees from getting inside the coat sleeves. Rubber or leather gloves give confidence to the beginner, but will soon be discarded. Many other devices are offered for sale, but they are not necessary, and should not be purchased by the beginner.

Light colored clothing of smooth texture, preferably of cotton, will be found better than rough woolens of dark color.

## UNIFORMITY OF APPLIANCES.

Whatever type of hive is used be sure to have all alike, for unless all hives, frames, etc., are interchangeable endless trouble will ensue.

It is not wise to try to make one's own hives. Few persons have the tools or the skill necessary to produce a satisfactory article, and accuracy is essential. The vital principle of all movable comb beehives is the "bee-space," *i. e.*, a space through which bees can pass and yet not so large as to induce them to build combs therein. A space through which they cannot pass they fill with propolis. Factory made hives have this detail carefully worked out.

Catalogues of dealers in beekeepers' supplies furnish full information on the various appliances.

The matter of hives and tools has seemingly perhaps been given undue attention, but unless the outfit is good the beekeeper will find much annoyance and needless labor, and unless he is a veteran, the troubles will make beekeeping so laborious and disagreeable that it is likely to be abandoned in disgust. It is true that honey may be obtained even though the bees are kept in an old box or hollow log, but profitable bee culture demands a suitable equipment.

## MAKING A START.

It is best to buy a good colony of bees in a standard hive, buying from some nearby beekeeper if possible. Also get for the first colony as gentle or easily-handled bees as the seller can furnish. If one's means warrant it, buy two such colonies, using one for study and experiment, and the other for honey, and as a reserve in case of disaster to the first, for frequent overhauling of a colony of bees is not conducive to its success or thrift.

It has sometimes been advised to start by buying bees in a box or any old hive and transfer them to a modern hive "for the experience." It is the sort of experience to dampen the ardor of the most enthusiastic, and an experience which a wise and thrifty veteran avoids as he would a pestilence.

## TIME TO START.

May and June are the most favorable months to make a beginning, but July or August will do, provided the novice does not try to increase the stock by division of the colonies. In buying earlier than May, one is not so sure of obtaining a strong colony, and the desire to examine and overhaul them may be irresistible, and is likely to prove disastrous to the bees. If purchased in September or October, little opportunity is offered for study, and about all that can be done is to see that sufficient food is in the combs for winter use. Winter is a most unwise time to buy bees, and even the skilled veteran avoids purchase then, unless he is thoroughly familiar with conditions as they were in the fall.

## BEES AND THEIR LIFE HISTORY.

The more complete one's knowledge of the life and habits of the bees the easier and more rapid will be the progress in learning how to keep them and the better the chances for success.

## THE QUEEN.

The "queen," so-called, is merely the mother bee, and there is normally but one in a colony. She lays all the eggs from which the bees of the colony are produced. Upon her vigor and the virtues of her blood and mating depend the thrift of the colony. If she is old or failing, the colony dwindles. If her "blood" is not good her offspring cannot be expected to accomplish the results of offspring from a better bred queen. (See Figure 14).

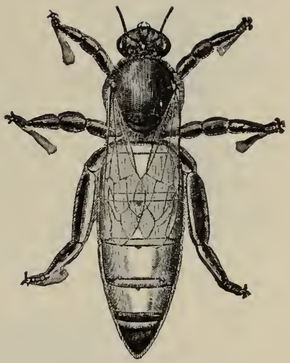


FIG. 14.—Queen.

A queen lives for several years, but as a rule is past her prime and period of greatest usefulness after her second summer. There are exceptions to this, but the rule is a safe one to go by, and all queens should be replaced by young ones after the second summer. Many successful beekeepers re-queen all colonies each year.

## THE WORKERS.

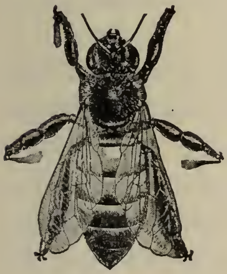


FIG. 15.—Worker.

These are the most numerous members of the colony. They are females, but with the reproductive organs not fully developed and only under some abnormal conditions do any of them lay eggs, such layers being termed "laying workers" and their eggs produce only drones (males).

The workers gather all the honey, pollen and propolis, secrete the wax, build the comb, maintain the heat of the colony, feed the larvæ and do all the work of the hive. They are also the ones which do the stinging. (See Figure 15).

## THE DRONES.

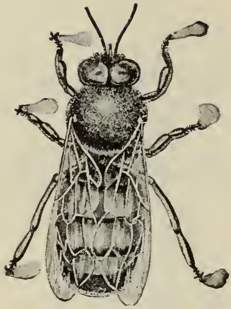


Fig. 16.—Drone.

These are the male bees and normally are produced only at such seasons as bees rear young queens and swarm. They have not the instinct nor are they constructed so they can work. Their sole known function is to perpetuate the race. They are much larger than workers or queen and they have no sting. (See Figurs 16).

## BEE BEHAVIOR.

The fundamental law of honey-bee life is co-operation. Though each individual goes about her work of her own volition, the results of her efforts are added to those of the rest of the colony.

The bees cluster in a more or less compact mass for mutual warmth, and when so clustered build their combs and care for their young. Within that cluster the temperature during the active season is close to 98° F. The greater the number of bees the easier it is for them to maintain throughout the hive the necessary temperature. If colonies are not populous, the bees have to cluster more compactly, the queen's room for laying is restricted, and during the harvest time the field force may only be able to get food enough for themselves and the nurses and young.

In the winter a good colony of bees contains from 3,000 to 6,000 workers. Along about the first of January the queen begins to lay, slowly increasing her laying as the season advances. As the young bees begin to emerge from the comb the queen becomes more active and, if everthing is normal, by the time fruit trees bloom, the whole ten combs will contain some brood, most of the combs being well filled. A colony in such condition is ready for the harvest.

If the inquisitive beekeeper frequently opens the hive in the spring, or keeps out combs unduly at that chilly season, abnormal conditions are produced and the colony will not be as strong or may even be destroyed.

## SWARMING.

As the season progresses and the population of the hive increases, preparations for swarming may be made. Queen cells are built, (See Figure 17) and when the young queens are nearly ready to hatch, the swarm emerges, usually on some sunny morning. They pour out like a torrent of living water and rapidly rising into the air, dart and circle about until finally they begin to gather on some limb or other object, and soon they are all clustered in a big irregular mass. If not taken down and hived they will seek some cavity and enter it. Within the hive or cavity they again cluster and most of them remain very quiet. Slowly the wax scales push out from between the rings of the abdomen and are taken and worked into comb, which is soon occupied with eggs, pollen and honey.

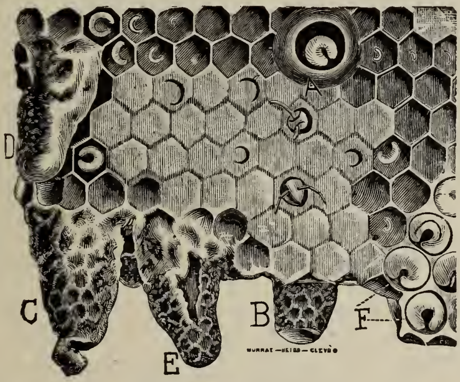


Fig. 17.—Queen Cells.

Bees of most all ages go out with the swarm and the queen joins the throng usually when the swarm is about half out. If the queen fails to go with the swarm they will return to the parent hive.

If only a small part of the bees go out as a swarm, another swarm may follow when the young queens begin to hatch, or it may be delayed until the surviving young queen flies to mate.

Young queens mate about ten days after leaving the cell, though from adverse weather or scarcity of drones, it may be deferred for two or three weeks. As soon as mated the queen returns to the hive and within a day or two begins laying.

Young queens sometimes mate several times before they begin to lay, but after they commence to lay they never mate again. If a queen fails to mate she will ultimately begin to lay, but her eggs will produce only drones. These may be placed in worker comb, but as soon as the bees cap the brood the raised bullet-like cappings betray the sex of the contained young. Such a queen should be replaced with a good one.

The average time of incubation of the eggs is three days, though it varies with the temperature. From the eggs a minute white grub (larva) is hatched, and this is supplied with and lies in a milky white food prepared in the stomachs of the nurses from pollen and honey. It is fed thus for six days by which time it has grown until it fills the cell and it is then capped over and spins its cocoon and metamorphoses, turning from a grub into a bee as does the caterpillar into a butterfly.

The worker takes twelve days to make the change and the drone fifteen.

The "queen larvæ" receive a more abundant supply of the prepared food and take only seven days to change from grub to perfect bee. It is currently said that larvæ intended for queens receive a different food from that given to the worker larvæ, but there are now good reasons for believing that it is quantity only that is varied, the chemical difference arising after it is put into the cells.

If the queen of a colony is removed intentionally or accidentally, the workers proceed to raise one or several more by enlarging some of the cells containing worker (female) larvæ, and supplying the necessary food. In due time such individuals emerge as perfect queens. If the bees have neither eggs nor young larvæ they cannot raise a queen and unless the beekeeper supplies brood or a queen, the colony will perish. The bees rarely tolerate more than one laying queen in the hive at a time. Perhaps it were more correct to say that the queen rarely permits another queen to remain long, for man can put in several queens and have each one laying for a time, but sooner or later all but one disappear.

## IMPORTANCE OF GOOD QUEENS.

The success of the colony depends upon the queen, so it behooves the beekeeper to see that each colony has a young and vigorous one.

## INTRODUCING QUEENS.

Introducing a new queen is a matter of much anxiety to the beginner. The first essential is to remove the old queen or if she is missing to be sure that no capped cell or young queen is present. Two methods of introduction are in common use, the "cage method" and the "direct." By the first, the queen is confined in a small cage usually with a few attendants, and the exit of the cage is plugged with a sort of candy made of powdered sugar and honey kneaded together. The cage is placed on top of the frames or between the combs and allowed to remain until the candy has been eaten out and the queen freed.

The "direct method" consists of letting the queen run in free. It is helpful to confine the queen alone and without food for twenty to thirty minutes before running her in, in the meantime keeping her warm. The key to success in this method really lies in getting the bees of the colony to which the queen is to be given into a condition of extreme distress or "fear." The experienced operator does this readily with smoke, and his ear quickly tells the "pitch" of the bees "roaring," which indicates the desired condition. When this is reached the queen is run in either at the entrance or on top of the frames, preferably at the latter place, and the hive quickly closed. She is immediately one of the mass of distressed bees each turning to the other for "help" and when the disturbance subsides she is quite as much at home as they are. A colony infested with laying workers will accept a queen run in in this way when they will not in any other, but unless they have been given a frame of unsealed brood shortly before or soon after the queen is introduced, they not infrequently destroy her in a few days or a week, or fail to properly feed the young. As a rule a colony containing laying workers is of too little value to try to save and should be united with some normal colony.

## CLIPPING QUEENS.

For the convenience of the beekeeper at swarming time all queens should have their wings clipped. As the queens use their wings in helping themselves out of cells after laying it is not wise to cut both pairs of wings. It will be found sufficient and best to snip only the tips from the wings of one side. The queen may be able to fly a very little, but not enough to enable her to go far or to rise to some inaccessible limb with the swarm.

## HANDLING BEES.

Bees are more easily handled in the forenoon than later. At such times most of the field bees are out and the young bees in the hive are not as troublesome as the older or field bees. Very young bees, however, do sometimes have a faculty for running wildly over the combs, particularly when the older bees are present only in small numbers. This action often bothers a novice when he is trying to find a queen.

## USING THE SMOKER.

Oftentimes no smoke is necessary in handling bees, but it is a good rule never to open a hive without having a good supply of smoke available. Most anything which will burn will do for fuel in the smoker, but on most farms old burlap bagging which has been lying around in the open until it has begun to decay is available in abundance and makes ideal fuel. New or unrotted burlap does not kindle or burn at all well. Chips, partly decayed wood, cotton waste or rags, or any similar substance, will do. Some beekeepers always begin with a puff of smoke at the entrance, others never use it there, and results seem to favor the latter. After starting the cover loose, a slight puff of smoke is blown under it, and then it is removed. If the bees show signs of "boiling up" over the tops of the frames, more smoke is blown over them from time to time. Not much smoke is needed, in fact, the beekeeper should study to see how little can be used.

## REMOVING FRAMES.

To remove a frame from the hive push back and remove the "division board" (follower), (Fig. 18), making room to spread the frames so as to give space to take out the desired one. If a little room is not thus secured, the bees are rolled over and over with the bees on the adjacent combs and much irritated, making work difficult and disagreeable for the beekeeper. "Ten-frame" hives will not take ten frames and allow for such sliding back, so for easiest work nine frames and a division board (follower) are used.

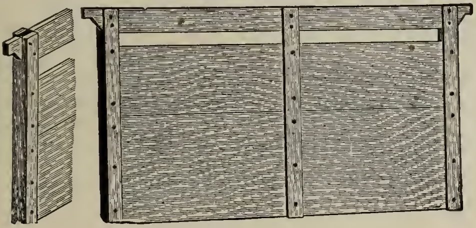


Fig. 18.—Division Board or Follower.

Handle combs with quiet easy movements. Avoid quick, nervous motions or striking at bees. If stung scrape out the sting with knife or finger nail and blow a little smoke on the spot to hide the odor, as bees are excited by the odor of the bee poison and often follow up the first sting with others when it is not so treated. The veteran, however, gets more or less immune to bee stings, and unless they come thick and fast, pays but little attention to them.

If the bees get much excited and begin to dart at one's veil, burrow into the clothing and generally show signs of "anger," the hive should be closed as quickly as possible and operations deferred until some other day.

## STINGS.

Bee stings are rarely serious unless received in great numbers. The pain is not long continued, and the swelling which (except on seasoned veterans) usually follows rarely remains for more than a couple of days. A little honey smeared over the injured spot will afford as much relief as anything. If you fail to appreciate your appearance after a sting or two on the face try to console yourself with the thought of the amusement it gives those who look at you, then grin—but not when anyone is looking.

## CAUTION.

Avoid handling bees on cold or wet days or on very windy days. Do not go prying into the brood nest of big colonies when they are busy piling up a surplus. Interference at such times is needless and detrimental, besides, a populous colony, for instance, one that is filling the body and several supers, is a difficult thing for anyone but a skilled bee-master to pull to pieces, and he rarely does it if it can be avoided.

In handling combs always keep them "edge up." Do not turn them over "flat ways" or you may find them breaking from the frames.

Keep your colonies strong. This is old advice but good. Unless they are strong they will not give the best results. Vigorous queens will do more towards giving strong colonies than any possible fussing of the beekeeper. For Rhode Island it has been found that best results follow when the colonies are re-queened in August with queens which were reared in late July or early August. Also the colonies are not so populous then as earlier and finding the old queen is easier.

## UNITING BEES.

When honey is being gathered freely the bees of different colonies may be put together without any precaution, but at other times it may be necessary to get them into quite an uproar with smoke before uniting them. The uniting may be done by setting one hive body directly on another, letting the bees mingle at will; or the combs with bees on them may all be put in one body; or the bees may be shaken from the combs before a hive and allowed to crawl in. Queenless bees unite more readily than those having a queen. If one of the queens is not removed by the beekeeper the bees attend to the matter, at least one queen or the other is soon despatched.

## MOVING COLONIES.

Do not change the location of the hives in the apiary after the bees have begun to fly in the spring, unless one of these two methods is followed: either moving but about a foot each day; or confining the bees to the hive and placing them in a cool cellar for three or four days and then liberating them at night and placing some obstruction, such as a bunch of grass or a bush, before the entrance. This assists in making them "take their location" when starting out the next day. When confined to the hives they should have wire cloth over the top of the hive and over the entrance. If the weather is hot, a sponge or roll of cloth saturated with water should be laid on the wire.

## ROBBING.

When working among the bees take pains not to spill any honey about or leave comb containing honey where the bees can get at it. Sweets so exposed may start robbing and this is particularly likely to occur if little or no food is to be found in the fields. Robbing once well under way is an unpleasant, even a serious matter. The easiest way the writer has found to stop it has been to put an abundance of syrup or honey a few rods from the apiary and get the bees started on it by walking among the hives with a comb of honey until it was well covered with bees and then gently carrying it to the food and leaving it. If enough food is put there to keep the bees busy until dark and the empty receptacles left there for the bees to smell over the next day, the evil is generally stopped without further trouble.

## FEEDING.

The bee *master* rarely has to feed his bees, but sometimes drouth or storm make it necessary to supply the bees with food to keep them alive or for their winter stores. The feeding is preferably done inside the hive. An empty body is placed on top of the brood chamber, and a number of fruit jars filled with syrup and their tops covered with cheese cloth are inverted on the frames and the hive cover put on. The bees will take the food through the cloth. Be sure the cloths are tied on securely. A syrup, half sugar and half water, stirred together until the sugar is dissolved is right. If the feeding is done in the fall when the weather is cool, have the syrup warm, say about 100° to 120°. Feeding is preferably done near nightfall. For "winter stores" a colony needs about thirty pounds of honey or syrup. As the bees consume more or less of the syrup while moving it, it is usually necessary to feed about ten pounds more. Feeding for winter should be finished before the middle of October, preferably before the last of September.

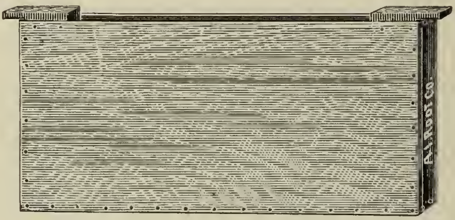


Fig. 19.—Division Board Feeder.

Normally strong colonies re-queened in August will, with an abundance of stores, come out strong in the spring, and no "tinkering" in the way of stimulative feeding in the spring will help them. Various feeders are sold by the supply houses, the most convenient being the division board feeder. (Fig. 19.) The fruit jar will be found to meet most needs, however.

## THE HONEY CROP.

With strong colonies the securing of the honey crop is a relatively simple proposition. It may be tersely stated as putting on the supers and letting the bees alone. Put on the queen-excluding honey board and the "super" on top of that. If the beekeeper is away much or cannot see the bees for a week or more at a time, put on at the start all the super room thought necessary. Do not be afraid to give "too much." If the colony is properly strong it will use the space as it needs it. If it is convenient, give the supers when the first flowers open of the kind from which the surplus is gathered, as at the time of apple bloom, &c. If not convenient to be on hand, then give them earlier.

Do not give supers to colonies which have not bees enough to fully cover the combs of the brood nest. Better unite two such colonies, making one strong one, and give that the supers.

In producing honey in "sections" it is desirable to remove them as soon as the bees have capped the combs in order to retain the whiteness of the cappings. As part of the combs are often finished sometime ahead of the rest, it is sometimes deemed wise to remove the supers, take out the finished sections, refill the supers with the partly filled sections and return them to the bees. The bee escape board is excellent for removing comb honey as the bees leave the combs quietly without cutting the cappings. Put on the escape boards near night and remove the honey in the morning. Usually only one super is removed from a hive at a time. If two or more are to be taken from one hive or if the weather is hot and close, it is often wise to slip nails or chips under the hive cover just enough to let the air circulate, but not enough to let bees pass.

In removing combs for extracting, the escape board may be used and is especially helpful to beginners. If it is not used, the combs are taken from the super or upper story one at a time, and the bees shaken or brushed from them either into the hive or in front of it, and the combs taken indoors. A bunch of asparagus tops or coarse grass makes an excellent brush. When it gets sticky throw it away and get a fresh one.

## EXTRACTING.

At best, extracting is a sticky and laborious job. It comes when the weather is hot and often when other work is pressing. It may, however, be deferred until some more convenient season, if one has plenty of surplus combs. Also the longer honey remains in the hive the richer and better it becomes. All one has to look out for is to get the crop of light-colored honey off before the dark honey begins to be gathered, and herein the value of knowledge of the honey yields (pasturage) of the locality becomes apparent.

After the combs are safely indoors they may be left in some warm and dry room shut up from bees and ants until it is convenient to extract, or the honey may be extracted at once and the emptied combs returned to the bees. Give such combs at as near night fall as possible. Combs fresh from the extractor create great excitement among the bees, and if given in the day time are liable to cause trouble.

## UNCAPPING.

Uncapping the combs is done with a keen stiff-bladed knife, a butcher's knife with a twelve-inch blade is excellent. A pan or tub is used to catch the cappings. The frame rests on a strip of wood placed across the tub and while the frame is held by one hand, the other slices off the capping with a downward sawing stroke. Deep cutting does no harm as the bees quickly repair the combs.

If the honey is very thick or not very warm it may throw out very slowly. If so, throw it partly from one side, then all from the other, and then finish the first side. This procedure avoids crushing the combs into the wire baskets of the extractor.

For a limited amount of honey an extractor is not necessary. If the combs are newly built and are filled above a queen-excluding honey board, they will be free from young bees and contain little or no pollen, hence may be cut from the frames, crushed in a bag of strainer cloth and hung in some warm place to drain. This treatment may be given the cappings to obtain the honey mixed with them. After the honey has drained out, the comb is emptied into any convenient receptacle — except one of black iron or rusty tin—and melted and strained.

## SWARMS AND THEIR TREATMENT.

With all man's care and precautions bees seem prone to swarm just when it is least desired, which is when they are most busily at work gathering honey, and this seems particularly so when they are storing in sections. Shade, large entrances, an airy location, plenty of room for queen as well as for storage, all tend to deter swarming, but some always seem bound to swarm. About half the colonies in an apiary usually swarm under the systems mostly in vogue.

When the bees do swarm, if the queen was clipped she will be found on the grass or ground not far from the hive. She should be picked up and caged with a few of her workers. The hive should be set to the rear and another containing only frames with narrow starters of foundation put in its place. By this time the bees, not having a queen with them, will be coming back. Lay the caged queen at the entrance while transferring the honey board and supers, with all the contained bees from the old to the new hive. Next shake all the bees from about half of the combs of the brood chamber of the old hive in front of the new one. In doing this have a wide board, hive cover or box placed level with the hive entrance to shake the bees on. When the majority of the bees are in, liberate the queen at the hive entrance and see that she goes in, using a puff of smoke if need be. Usually the bees will settle down to work again, and having no combs for storage below, will put all the honey above. Generally this is an excellent plan, but sometimes it does not work, the bees trying to swarm again. If this occurs, re-cage the queen, and place the cage in the hive for a few days. If the beekeeper is not on hand to see the swarm, the bees, on missing the queen, will return to the hive. A few may find the queen in the grass and gather about her and thus indicate her whereabouts to the beekeeper. If she is not given back to the bees, or if the beekeeper is away and the queen perishes, the bees, after a day more or less of uneasiness, settle down to work again. If they have plenty of ventilation and storage room they rarely swarm with the young queen which succeeds the first swarming.

If the queen is not clipped and the swarm clusters where it can be reached, it is usually easiest to shake it into a basket or box, cover it with a cloth, carry it to the stand it came from, and when the new hive is ready, pour out the bees in front of and against the hive just as if they were so many beans. Keep empty hives which are awaiting swarms in some cool place or shaded. Bees do not readily enter hot hives.

## FORCED SWARMING.

When a colony seems to be preparing to swarm, indicated by great population, starting of queen cells, bees hanging in masses on front of hive or about the entrance, it is the practice of some beekeepers to shake the bees from the combs, giving the bees a new hive on the old stand as in natural swarming, transferring to it the supers with the contained bees and giving the old brood chamber with its combs to some other colony to care for. Some vary this method by leaving about half the combs unshaken and placing the old hive at one side of the new. In a week it is changed to the other side of the new hive, and a week later back again; this is to throw the force of young field bees into the "swarm."

Another variation is to give the brood from which the "swarm" was shaken, to some weak colony, a week or so later de-queen it, and the next day shake most of the bees into or before the swarm. In forced swarming it is well to make the "swarm" enter the new hive through a queen-excluding honey board temporarily placed under the hive body or through an "entrance guard" of excluder metal or through a drone trap. This shuts out all the drones. The queen is put inside the hive. It is wise to leave the guard or "excluder board" in place for a few days, for "forced swarms" sometimes get uneasy and "swarm out." As soon as they have settled down to work again the guard should be removed. The drones are kept out so as to avoid one disturbing element (as they are such when confined) and also to keep them from choking the entrance in their efforts to get out while the guard is on.

Forced swarming is profitably followed when treating colonies afflicted with any of the contagious diseases, *except* that the combs taken away are not later shaken before the "swarm" for if they were, re-infection would be certain.

## REARING QUEENS.

Every beekeeper should raise his own queens and not depend upon the commercial queen breeders for anything but a new queen for breeding purposes.

The easiest way to secure a few young queens is to divide the combs of a colony that has swarmed into lots of twos or threes, seeing that each lot has one or more queen cells. Place these combs in empty hives, reduce the entrance so but one or two bees can pass, and place the hives away from the large colonies, if convenient. In due time the young queens will hatch and mate and may then be used as desired.

Another simple way is to take a comb, preferably not a very old one, put it in the middle of the colony from the queen of which it is desired to raise new queens and five days later remove it. It will be found to be filled with eggs and very small larvæ. With a knife slice off a couple of inches or more from the lower part of the comb. This is to give the bees a better opportunity to build cells and also they will be built in a more convenient place for the beekeeper.

Place this comb with its adhering bees, but without the queen, in an empty hive and on each side of it place a comb containing honey and pollen. Also give water in a division-board feeder or by a sponge. Now shake into this hive all the bees from two frames taken from the center of the same or of another good colony, being sure not to get the queen. Close the hive entrance with wire cloth and put the hive in the cellar or some moderately cool place for twenty-four hours, then set it out of doors, remove the wire and reduce the entrance. The liberation is prefereably done near nightfall.

Four days after the first cell is sealed, form small colonies (nuclei) of a frame or two of brood and bees, confine them as the cell building colony was treated, liberate them the next evening and give each little colony a sealed cell. To do this easily, cut the cell from the comb together with a piece of the comb, say an inch square, and slightly separating two combs of the small colony (nucleus) place the cell part way down between them and push the combs together enough to hold it.

Two factors are important in raising queens, food and warmth. The first is secured by having an abundance of young bees (nurses), and the second by the abundance of bees, reduced entrance, and if needs be, as during a cold storm, covering the hive with tarred paper or some similar method.

The best queens are generally raised in warm weather and during a good honey flow. If they are to be raised when little honey is to be found in the fields, feeding will be necessary. It must be constant until the cells are sealed. Use only sugar syrup for such feeding. Honey so used is liable to induce robbing.

## RACES OF BEES.

If the bees one has are good workers and handle fairly well, it is wise to go slow in changing them. Most bees in Rhode Island are Blacks or Italians, or a mixture of the two. Some of the less common races have been introduced, but have soon become merged with the others. The Italian bee is probably the best all-round bee we have. The different strains vary in color or work in slight degree. If it is desired to change one's stock, buy a few queens, getting one or two each from different breeders. Try them out for a year and then breed from the best. The "leather-colored" Italians are to be preferred to the "yellow" or "golden" type.

## INCREASE.

If increase is not desired, the brood and remaining bees left by a swarm are united with some other colony after removing its queen or after destroying the queen cells in the hive the swarm left. If increase is desired, the old hive, now much reduced in numbers and without a queen, is placed on a new stand and looked at in about a fortnight to three weeks to see if the young queen is laying. With a good young queen it will soon become strong.

## ARTIFICIAL INCREASE.

Colonies of bees may be divided into two or more parts, the old queen left with the part on the old stand and a new queen given to the other part. The hives are filled out with combs or frames containing full sheets of foundation and the bees allowed to build up. This form of increase is excellent, but needs to be done with caution. It is best done during a good honey flow, but done then it puts an end to hope of surplus from the colonies treated. Indiscriminate division is unwise, and if a colony is divided into many parts, each may be too small to thrive, and the whole colony be lost.

Another excellent way to increase, but a little more laborious is to take a frame of brood with adhering bees from each of five or six colonies, put them together in one hive, fill out the empty space with combs or frames of foundation, and introduce a queen. If seven or eight frames of brood are taken this method may be used as late as the middle of September, but as a rule it is not wise to divide colonies after the middle of August. An expert may safely do it later but the beginner had better not try it.

## MARKETING HONEY.

There are a few rules which should never be forgotten and should always be followed if one wishes to succeed in the honey business:

First: Never sell or give away any unripe or ill-flavored honey.

Second: Always have the packages clean and free from stickiness. If in bottles, jars or cans, be sure they do not leak.

Third: If producing considerable quantities of honey and selling to stores or shipping it away have each case of comb honey all of one kind, and all sections as near as possible equally filled and capped. Have the honey of each lot in bottles of the same kind.

Sell first to your neighbors, next to the stores in your nearest town, and by the time your crops are too large for them to handle you will have learned where and how to sell large quantities. If you start supplying a store, try and reserve enough honey of the kind you start with to carry that customer through to the next season. Nothing so upsets the honey trade as a change in the flavor of honey. Many beekeepers are now practicing "blending" or mixing their various sorts of extracted honey so as to have it all of one general flavor. This is excellent practice, but requires experience for its greatest success. Strong flavored or very dark honeys must be scrupulously left out of such blends.

The best that can be done with comb honey is to see that in each case all of the sections are of the same crop and endeavor to supply only one kind to one customer for the season.

When customers comment on the differences in flavor it is necessary to explain that the flavors of honey from different sorts of flowers vary as do the odors.

Extracted honey will granulate or crystallize in time, hence it is not wise to bottle at one time more than the customer is likely to dispose of before it begins to granulate.

In melting granulated honey heat it slowly and as soon as it softens stir it from time to time that it may heat uniformly. Be careful not to over-heat it or the flavor will be injured or spoiled, and the honey darkened. About 130° F. is as high as it is safe to heat it.

## PREPARATIONS FOR WINTERING.

These should begin in August with the re-queening of the colonies. If there is a dearth of nectar and the prospects of an immediate flow are slight, it is good policy to stimulate the production of brood. Probably the very best way to do this both for economy of labor and material and for the excellence of the results is to hang in each brood chamber one of the "division board" feeders (Fig. 19), filled with soft "Coffee A" sugar. Do *not* add any water to it. This system was devised by Mr. Samuel Simmins, an eminent British beekeeper, and is one of the best things he ever gave to the public. The bees feed on the sugar just fast enough to keep the queen laying well. They do not store any of the liquified sugar in the combs.

By the time the first frost cuts short the flowers, the colonies will be found to have a large population of young and vigorous bees. If the "fall flowers" did not yield enough to fill the combs well with honey the bees must be fed at once. Syrup of granulated sugar and water is the proper thing to use. Do *not* use "Brown" sugar. Make the syrup half sugar and half water, or if you have delayed too long, until the days as well as nights are cool, make it two-thirds sugar and one-third water. Feed enough so that the bees have not less than thirty pounds of stores. A Langstroth comb when filled contains about six pounds of honey, and in estimating supplies remember that brood combs contain much pollen and if hive and contents are weighed and from the gross weight the weight of a dry hive and set of combs are deducted, remember that old leathery or pollen-filled combs weigh very much more than new ones and that the bees weigh from three to six pounds or even more in a very strong colony. Better give more than you think they need, and then some more.

Bees do not use much food in winter (sometimes as low as two pounds), but when they get right down to brood rearing in the spring, stores vanish like snow in the summer's sun. When all colonies are supplied with food, see that all covers are water tight, that the hives are level, or tilt slightly toward the entrance, fix the covers so they cannot blow off and then let them strictly alone until late spring. If mice are numerous it is a good plan to put across each hive entrance a piece of wire cloth with meshes large enough for bees to pass, but too small to admit mice.

If single ply tarred paper or any other waterproof black paper is laid over each hive, folded down around the sides as one would do up a bundle and secured by strips of lath tacked along the lower edge, excellent protection is afforded both from moisture and from wind. Never close the entrance. It may be reduced in size, even down to a square inch, but the experience of years has shown that colonies with entrances wide open (*i. e.* 14 by 1 inch) are not only just as strong in the spring as those with reduced entrances, but often stronger.

*Attend carefully to this fall work* No amount of fussing and feeding in the spring will make amends for neglect in the fall.

## CELLAR WINTERING.

It is quite unnecessary to put bees in the cellar in this climate, in fact they are much better off out of doors. Some persons put them under sheds, packing all about with leaves or similar material. This is unwise as the hives get damp and the bees do not get the benefit of the sun and air. Leave them where they stood all summer, merely erecting some sort of a wind break if in an exposed place.

## ENEMIES.

Bees have few real enemies here. Skunks sometimes disturb them when the hives sit close to the ground. Ants not infrequently annoy them and occasionally become a real nuisance. They are readily destroyed by pouring gasoline into their nests, or the legs of the hive stands may be placed in tin can covers and a little crude oil or kerosene poured into each. Birds rarely disturb them. The king bird or bee martin catches a few, but as these birds do so much good in devouring various noxious insects, we can well afford to give them a bee now and then. To a person engaged in commercial queen rearing a pair of king birds may become a decided pest, for they seem prone to catch the young queens. If shot at a few times with blank charges they rarely fail to change their hunting ground.

"Wax moths" are often accused of killing out the bees. The bees whose hive becomes infested with the larvæ of these moths will be found to be depleted in numbers through loss of the queen, disease, or some unfavorable circumstance. The strong colonies will quickly dislodge any they can reach. Weak colonies, however, seem discouraged and give up the struggle against them until ere long the combs are reduced to a mass of webs and dirt. When discovered in this condition, scraping the hive clean and burning all the refuse is all that can be done. The chief preventive to their inroads is to keep the colonies strong, by having a vigorous queen in each one.

Combs not in use should be stored in some dry room and inspected occasionally. If the "wax worms" appear, the combs should be fumigated with burning sulphur and returned to the room.

## DISEASES.

There are two contagious diseases of bees now recognized, both of which attack the brood or bees in the larval stage, and are known respectively as American Foul Brood and European Foul Brood, the latter being sometimes called Black Brood. The so-called Pickled Brood is seldom met with and does not seem to be infectious. The term "foul" as applied to brood disease was given on account of the odor emanating from the dead brood. The larvæ die in the cells and turn brown or black. The colony becomes depleted in numbers and unless treatment is prompt and thorough the disease will spread through and destroy the whole apiary.

In case of trouble or suspected disease, beekeepers are requested to write to the Entomological Department, State Board of Agriculture, State House, Providence, R. I., and the Apiary Inspector will render such aid as may be necessary.

# Department of School and Home Gardens.

Reports under this heading deal with work done in co-operation with the
Extension Department of the Rhode Island State College,
the League of Improvement Societies in Rhode
Island, and other organizations.

BY

A. E. STENE, E. K. THOMAS,
and others.

CHILDREN'S EXHIBITS AT COUNTY FAIRS: PREMIUM LIST.
RHODE ISLAND BOYS' CORN GROWING CONTEST:
    PREMIUM LIST.
    HOW TO GROW CORN.
REPORT OF CHILDREN'S SCHOOL AND HOME GARDEN WORK FROM 1905 TO 1910 INCLUSIVE.

PROVIDENCE, R. I.
E. L. FREEMAN COMPANY, STATE PRINTERS.
1911.

State of Rhode Island and Providence Plantations.

EXTENSION BULLETIN

Published monthly by the Extension Department, Rhode Island State College, and entered at Kingston, R. I., as 2nd class matter.

VOL. 1. KINGSTON, R. I. MARCH, 1911, NO. 1

A CHILDREN'S EXHIBIT.

# CHILDREN'S EXHIBITS AT COUNTY FAIRS,

## WASHINGTON AND NEWPORT COUNTIES.

**Joint Bulletin of the Extension Department R. I. State College and the State Board of Agriculture.**

PROVIDENCE:
E. L. FREEMAN COMPANY, STATE PRINTERS
1911.

# Children's Exhibits of Agricultural Products.

## CONTESTS AND EXHIBITIONS FOR BOYS AND GIRLS.

In many parts of the country the children's department at the county and state fairs is a very important one, and the annual exhibits are looked forward to with much interest.

Prizes are awarded for many things other than the direct products of the soil. For instance, in Nebraska, the boys enter competitions in rearing domestic animals, and the girls in making preserves, sewing and cooking. The work affords considerable pleasure and profit to the children.

### BOYS' CORN GROWING CONTESTS.

In many of our western and southern states corn growing clubs are doing an immense amount of good by teaching the boys how to raise maximum crops from a given area, and at the same time creating a spirit of friendly rivalry. This work has given a tremendous impetus to the development of a better citizenship and a better agriculture in the states where the work has been conducted.

The subject of agriculture is attracting a good deal of attention in elementary education at the present time, and with the approval of the Honorable Walter E. Ranger, Commissioner of Education in Rhode Island, the State Board of Agriculture, Rhode Island State College, and the Rhode Island Normal School, in co-operation with the State Horticultural Society, local agricultural societies, and the Granges, commend to the consideration of teachers and parents in Rhode Island a similar contest for Rhode Island boys.

A bulletin dealing especially with the Rhode Island Boys' Corn Growing Contest has been issued, and a copy may be obtained from the Secretary of the State Board of Agriculture, State house, Providence, R. I., or from the Extension Department of the Rhode Island State College, Kingston, R. I. This bulletin will be accompanied by a premium list, giving the date of the exhibit and a list of a large number of attractive prizes to be awarded.

## BOYS' AND GIRLS' COUNTY FAIR EXHIBITS.

The Washington County Agricultural Society has offered prizes for children's exhibits for several years, and while there have been quite a number of exhibits, many boys and girls of the county have not taken advantage of the opportunities offered. This year the number of premiums is increased in the hope that more children will compete for them, and the Newport County Agricultural Society has also arranged to have an exhibit with similar prizes, except that no prizes are offered in Class IX.

Boys and girls should notice also that if they have exhibits at the county fairs, they are admitted free of charge on the first day, and may, if they have an especially good exhibit, earn a ticket for the other days of the fair.

The following prizes will be offered to children living in Washington County at the Washington County Agricultural Society's fair, which will be held September 12–13–14 and 15, 1911, and to those living in Newport County at the Newport County Agricultural Society's fair, which will be held September 19, 20, 21 and 22, 1911.

Boys and girls intending to compete in the following classes should send in their names and addresses, also name and address of the principal or teacher of the school that they attend, or of their father, mother, or guardian, to the Extension Department, Rhode Island State College, Kingston, R. I., before the first of June, 1911. This will enable the College to send them any suggestions which may be issued, regarding the growing of crops for these exhibits.

## DIRECTIONS FOR BOYS AND GIRLS INTENDING TO GROW VEGETABLES AND FLOWERS FOR THE EXHIBIT.

Notify the Extension Department, R. I. State College, before the first of June.

State at which fair you intend to compete, and the class in which you intend to exhibit. Send your name and address, also name and address of your teacher in school, if you attend one.

Entries of exhibits must also be made with the secretary of the fair at which you intend to exhibit, before the first of September.

Plan as early as possible for the exhibits which you intend to make. Do not try to enter in all the competitions, unless you have plenty of room for a large garden and are sure that you can take care of the plants throughout the summer. It is much better to enter in two or three classes and make a special effort to have a good exhibit, than to enter in several and find that you cannot devote sufficient time to the work.

## PREPARATION OF PRODUCTS FOR THE FAIR.

Do not collect the exhibits until just before they are to be taken to the fair grounds. If gathered too soon and allowed to lie around for an unnecessary length of time, they will lose a good deal of their freshness and good appearance. Better gather, if possible, the evening before, or on the same day that the products are taken to the fair grounds.

Select good, well-matured, typical specimens of each kind. Pick a few more than are needed of the very best ones that you can find; then select the best of these until you have the required number or quantity for each exhibit. Avoid any vegetables or flowers that are misshapen, overgrown, overripe, bruised or injured in any way. Avoid those that are injured in any way by insects or plant diseases. When more than one specimen of one variety is exhibited, have them as uniform in size and shape and color as possible. Beans and peas should not be too old, and pods of the same size and age, approximately, should be selected. All dirt should be carefully cleaned off, either by washing, or by careful brushing or wiping. In doing this be particularly careful *not to bruise* or *scratch* the specimens in any way. In sweet corn, the ears should not be fully husked before they are taken to the fair grounds. Husk them when they are put on the plate. In field corn select ears with butt and tip well filled out, the rows of kernels regular, and without insect injury or blemish of any kind.

## PACKING OF VEGETABLES FOR CARRYING TO THE FAIR GROUNDS.

Pack the vegetables in a box or crate just large enough to hold them. The box should admit air, either naturally or through holes bored in the sides. This is to prevent the heating of the vegetables. Line the box with paper and wrap each specimen if possible. Place the heavier ones at the bottom of the box and the lighter ones on top. They should be packed firm to avoid moving or rattling around in the box. Use excelsior or waste paper to fill in the empty spaces. Soft vegetables, such as ripe tomatoes and melons, should preferably be packed in a box by themselves. Flowers, of course, must be packed rather loosely and in a box by themselves, in order that they may not be crushed.

Label each exhibit carefully and legibly with the name of the variety, and the class in which it is to be entered. The age of the exhibitor and his grade in school should also be given.

Plan the arrangement of your exhibits on the tables to make them as attractive as possible. The largest specimens, such as turnips, cabbages, and squashes, should be at the back of the table, and the others in front.

The fair association will probably furnish plates, but if not, paper ones can be secured for the exhibits.

## IMPORTANT SUGGESTIONS.

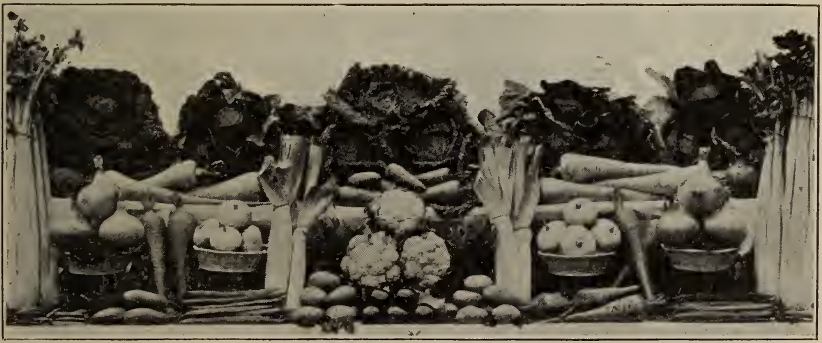
This plan of giving prizes for children's exhibits will be continued in future years, if it meets with a good response from the children.

Keep an account, therefore, of your work this summer. Note especially the mistakes which you make, in order that you may avoid trouble in the future and make a greater success of your exhibits. When the prizes are awarded, note reasons why your exhibits do, or do not receive them. Study the exhibits which won higher premiums than your own, and find out wherein they excelled.

All entries of exhibits must be made with the secretary of the fair on or before the first of September, 1911. If you live in Washington County, enter with Mr. John A. Allen, Peace Dale, R. I.; if in Newport county, enter with John M. Eldredge, Bristol Ferry, R. I. Entry blanks will be supplied on application to the secretaries.

All exhibits should be at the fair grounds early the first day. Competitors unable to attend may send their exhibits, carefully packed, to the grounds. Such exhibits should be marked "Children's Department," and should contain the name and address of the sender, and entry cards or information from which entry cards may be made out. Mark or pack each exhibit in such a way that those who open it may know under which class it is to be placed and what the variety is.

The contests are open to boys and girls under 18 years of age, in Washington county, and to boys and girls under 15 years in Newport county.



A WELL ARRANGED EXHIBIT.

## PREMIUM LIST.

Classes VII and VIII are open to any boy or girl in the State.

**CLASS I.**

| | | 1st. | 2nd. |
|---|---|---|---|
| Lot 1. | Exhibit 10 Ears Sweet Corn, any Variety | $1.50 | $ .75 |
| Lot 2. | Exhibit 10 Ears Pop Corn.............. | 1.00 | .50 |

**CLASS II.**

| | | |
|---|---|---|
| Lot 1. | Exhibit 10 Ears Field Corn, any Variety.. | 2.50 |
| Lot 2. | Exhibit Single Ear, any Variety......... | 2.00 |

**CLASS III.**

| | | | |
|---|---|---|---|
| Lot 1. | Exhibit Plate Dwarf Champion Tomatoes | 1.00 | .50 |
| Lot 2. | Exhibit Plate of Acme Tomato.......... | 1.00 | .50 |

**CLASS IV.**

The prizes for this exhibit are offered by W. S. Pino, Seedsman, Providence, R. I., and are as follows:

| | 1st. | 2nd. |
|---|---|---|
| Exhibit Collection of Vegetables................ | $4.00 | $2.00 |

In judging exhibits under this heading, the choice of varieties and quality will count for more than the number of varieties.

NOTE.—All entries in Classes I, II, III and IV must bear the name of the variety, and must be grown by the exhibitor.

A circular giving directions for growing the above crops may be obtained free by writing to the Extension Department, Rhode Island State College, Kingston, R. I.

Boys entering corn in Classes I and II may enter also in the proper classes at the State exhibit, which will be held in Providence in November. Write to the Rhode Island State College or the State Board of Agriculture for particulars.

| | | 1st. | 2nd. | 3d. |
|---|---|---|---|---|
| **CLASS V.** | Bouquet of Cultivated Flowers........ | $1.00 | $.50 | $.25 |
| **CLASS VI.** | Bouquet of Wild Flowers............. | 1.00 | .50 | .25 |

Exhibits in Classes V and VI will be judged on the choice of flowers, blending of colors, and artistic arrangement. Competitors may bring their own vases, if they prefer. Suitable vases will be provided for all who ask for them when entering their exhibits.

| | 1st. | 2nd. |
|---|---|---|
| **CLASS VII.** Collection of Fifty Different Kinds of Weed and Useful Seeds | $3.00 | $2.00 |

Competitions may be by schools or individuals. Glass vials may be obtained through the Rhode Island State College, Kingston, or by sending directly to McKall Brothers, Washington, D. C. The price is $1.50 for cloth-covered box and vials.

Instructions for making the collection will be found in Nature Guard Leaflet No. 31, issued by the State College. This will be sent to anyone who will make application and send his name and address to the Extension Department, State College, Kingston, R. I.

We strongly urge competitors in this class to obtain the regular case and vials used for such exhibits, which we mentioned above.

| | 1st. | 2nd. |
|---|---|---|
| **CLASS VIII.** Collection of Pressed and Mounted Wild Plants, Consisting of not Less than 15 varieties | $2.00 | $1.00 |

Those who compete in this class cannot compete for prizes offered for the same kind of an exhibit in another class.

IMPORTANT RULE.—Under Classes VII and VIII the same exhibit cannot be entered in the contests more than two years in succession.

**CLASS IX.**

| | 1st. | 2nd. |
|---|---|---|
| To the teacher whose pupils are most successful in the competitions | $6.00 | $4.00 |

Open to exhibitors in Washington County only.

In determining the relative success of pupils, two first prizes shall be considered equivalent to three second prizes, and four third prizes.

A prize will not be awarded to a teacher unless five or more of her pupils shall have made entry for prizes.

Where there is a school garden, an exhibit may be made from the garden. in the name of the whole school, a single grade, or preferably, each pupil for himself.

*Write only on one side of this paper.* Date________________

**ENTRY BLANK OF__________________COUNTY AGRICULTURAL SOCIETY FAIR.**

Mr.____________________, Secretary:

Dear Sir:

Please enter me for the exhibits hereinafter named in accordance with the Rules and Regulations contained in your Premium List.

Age____________ Signature________________________

Name of School which I attend__________________ Post Office________________

Name of Teacher________________ County____________State________

| Class Number | Lot Number | Describe each entry on a separate line. In addition to the description in the Premium List, give name of variety. | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
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| | | | |
| | | | |

*If you live in Newport County, fill out this blank and send to John M. Eldredge, Bristol Ferry, R. I. If you live in Washington County, fill out this blank and send to John A. Allen, Peace Dale, R. I. Extra copies of this entry blank can be obtained by applying to the Extension Department, R. I. State College, Kingston, R. I.*

JOINT BULLETIN OF THE RHODE ISLAND STATE COLLEGE AND
STATE BOARD OF AGRICULTURE.

# EXTENSION BULLETIN

Published monthly by the Extension Department, R. I. State College, and
entered at Kingston as Second Class matter.

Vol. 1. KINGSTON, R. I. APRIL, 1911. No. 2.

# PREMIUM LIST.

WORTHY OF IMITATION.

## RHODE ISLAND BOYS' CORN GROWING CONTEST AND STATE EXHIBITION OF CORN.

### Abstract from Report of State Board of Agriculture for 1910.

PROVIDENCE:
E. L. Freeman Company, State Printers.
1911.

# RHODE ISLAND BOYS' CORN CONTEST AND STATE EXHIBITION OF CORN.

## GENERAL RULES AND REGULATIONS GOVERNING THE EXHIBITION.

1. Any boy under eighteen years of age is eligible to exhibit in any class except in Class I, which is open only to boys under 14 years of age.

2. Those intending to compete should fill out and send to the Rhode Island State College, Kingston, R. I., blank No. 1, found on next to the last page of this premium list. By so doing, competitors will get all circulars and directions which may be sent out during the summer, in regard to the competition.

3. In addition to this, exhibits must be entered on blank No. 2, also found at the end of this premium list, at least two weeks before the date set for the opening of the exhibition. This blank must be sent to the Secretary of the State Board of Agriculture, State House, Providence, R. I.

4. Exhibits must be grown by the competitors, each boy for himself, except where the boys of a school or other organization band together to make a joint exhibit.

5. No exhibitor may make more than one entry for the same premium.

6. No distinguishing marks will be allowed on the exhibits after they are placed on the tables, except those authorized by the superintendent of the exhibition.

7. Each exhibit must have the name of the variety attached.

8. The exhibit must reach the exhibition hall two days previous to the opening of the exhibition.

9. The exhibition will be held in Providence in connection with the Rhdoe Island State Horticultural Society's November exhibition, the exact dates and hall will be announced later.

10. No exhibits will be received unless transportation charges are prepaid.

11. Competitors unable to attend the exhibition themselves may send their exhibits, carefully packed, to the hall. Directions for shipping will be sent to all who send in the entry blanks as directed in rules 5 and 6.

12. Such exhibits must have sent with them the name and address of the exhibitor, also the class and lot in which the exhibit is to be entered.

13. If more than one exhibit is packed in the same box, each exhibit must be packed by itself and labeled with the class and lot in which it is to be placed.

14. All exhibits will be staged at owner's risk. No responsibility will be assumed by the superintendent of the exhibit or by the Horticultural Society for errors which may occur, although every possible care will be taken to prevent mistakes or damage or loss from any cause.

15. If the exhibitor wishes to remove his exhibit after the exhibition is over, he must so state on his entry blank. All exhibits remaining at the close of the exhibition will be sold or disposed of at the discretion of the State Horticultural Society.

16. Under some of the special exhibits in Class J, it is required that the prize-winning exhibits must become the property of the party offering the prize.

17. The judges' decision will be final in all cases.

18. Directions for shipping, in addition to those found in the premium list and in the bulletin on corn growing, will be sent to all who signify their intention of competing.

19. The right to make necessary changes in the rules and regulations or in the premium list is reserved.

## GENERAL SUGGESTIONS.

Read the bulletin regarding the growing of corn and the making of exhibits, issued by the Extension Department of the Rhode Island State College and the State Board of Agriculture. This can be obtained by writing to the State College at Kingston, or to the State Board of Agriculture, State House, Providence.

Whenever possible, each exhibitor should enter Class G, the prize essay competition. See the bulletin on corn growing for suggestions as to keeping notes and securing data for this essay.

We would suggest that whether this essay is written or not, every exhibitor should accompany his exhibit with a statement of the area of corn grown by him, together with the yield secured. See suggestions in corn bulletin for methods of obtaining yield and for getting the area of the plot.

Competitors should not try to grow too many varieties or too large areas. It is better to grow one variety well on an acre or less than it is to have a number of varieties or larger areas that cannot be well taken care of. Besides this, competitors should remember that varieties grown near each other are liable to mix and spoil the corn for exhibition purposes. See corn bulletin.

The Bowkers Fertilizer Company, 43 Chatham Street, Boston, Massachusetts, is conducting a corn growing contest for boys, and those who wish may compete for their prizes as well as for those of the Rhode Island Boys' Corn Growing Contest, by complying with their rules, which will be sent to anyone who applies for them.

A similar contest is conducted by the New England Homestead, Springfield, Mass., which Rhode Island boys may take advantage of in addition to the other two, if they so desire.

These three contests offer an exceptionally good opportunity for boys to spend their summer profitably. Any boy growing one variety of corn can enter a number of different classes in all three contests, and if he wins prizes, the total amount of money received will well repay him for any work which he may do, and besides this, he will learn valuable lessons in methods of growing a crop, which in itself is very profitable.

If the contest is successful this year, the premium list will be enlarged next year. Prizes will be awarded for exhibits of other crops, and competitions in sewing and cooking will be arranged for the girls.

## THE PREMIUM LIST.

### CLASS A.—TEN EAR EXHIBITS.

The third prizes in Lots 1, 2, and 3, are offered by Barker & Chadsey, Hardware Dealers, Providence, R. I.

The third prize in Lot 4 is offered by A. F. & F. Bray, Hardware Dealers and Seedsmen, Pawtucket, R. I.

The rest of the prizes in this class are provided for by the State Board of Agriculture.

LOT 1.—*Rhode Island White Cap Flint Corn.* Three prizes—$5, $3, and one set of garden tools to the value of $2.

LOT 2.—*Yellow Flint Corn.* Three prizes—$5, $3, and one set of garden tools to the value of $2.

LOT 3.—*Yellow Dent Corn.* Three prizes—$5, $3, and one set of garden tools to the value of $2.

LOT 4.—*Sweet Corn.* Three prizes,—$5, $3, and $2.

LOT 5.—*Pop Corn.* Three prizes—$5, $3, and $2.

### CLASS B.—SINGLE EAR EXHIBITS.

The third prizes in Lots 1 and 2 are given by the W. B. Scott Co. dealers in hardware and agricultural supplies, Newport, R. I.

The first two prizes in Lot 3 are given by the Providence Seed Co., dealers in seeds and poultry supplies, Providence, R. I.

The first two prizes in Lot 4 are given by the W. E. Barrett Co., dealers in seeds and agricultural supplies, Providence, R. I.

The third prizes in Lots 3 and 4 are given by W. K. Toole, dealer in seeds and agricultural supplies, Pawtucket, R. I.

The first and second prizes in Lot 5 are given by the Mitchell Fertilizer Co., Providence, R. I.

LOT 1.—*Rhode Island White Cap Flint Corn.* Three prizes—$3, $2, and $1.

LOT 2.—*Yellow Flint Corn.* Three prizes—$3, $2, and $1.

LOT 3.—*Yellow Dent.* Three prizes—$3, $2, and $1.

LOT 4.—*Sweet Corn.* Three prizes—$3, $2, and $1.

LOT 5.—*Pop Corn.* Three prizes—$3, $2, and $1.

### CLASS C.—TEN CORN STALKS WITH EARS ATTACHED, ANY TYPE.

Prizes given by the J. B. Barnaby Co., clothing specialists, Providence, R. I.

Three prizes—$5, $3, and $2.

### CLASS D.—SWEEPSTAKES.

LOT 1.—*Best Exhibit of Ten Ears, any Type.* One prize—$25, given by the Rhode Island State Horticultural Society.

LOT 2.—*Best Exhibit of Single Ear, any Type.* One prize—$10, given by the Newport County Agricultural Society.

### CLASS E.—BEST DESIGN MADE WITH CORN COBS AND KERNELS.

One prize—$5, offered by the Union Hardware Co., Providence, R. I.

### CLASS F.—BEST EXHIBIT FROM A SCHOOL, GRANGE, OR CLUB.

First prize given by the Washington County Agricultural Society.

Second prize, $5, contributed by the Westcott, Slade & Balcom Co., dealers in paints, oils, insecticides, Providence, R. I.; and $5 by Browning, King & Co., outfitters for men and boys, Providence, R. I.

First prize—Silver Cup to the value of $15.

Second prize—$10.

This exhibit may include ten ear exhibits, single ear exhibits, stalk and ear exhibits, and designs made with corn. Exhibit will be judged on the number and merit of each.

(Read the corn bulletin carefully, and remember that no two varieties should be planted near each other on account of the fact that they are likely to mix.)

### CLASS G.—BEST ESSAY RELATING HOW CORN IN ANY OF THE EXHIBITIONS WAS GROWN.

This essay shall contain an account of the growing of the corn, from the preparation of the soil until it is ready to harvest; the dimensions and area of the plot on which it was grown; and also a financial statement showing the cost of growing the crop; the number of bushels of ears and shelled corn grown; the number of pounds of stover secured and the profit or loss in the venture.

Read the bulletin on corn growing for suggestions as to how to take notes for this essay.

Prizes are offered by the Photo Department, Hall & Lyon Co., Apothecaries, Providence, R. I.

First prize—$5 Camera. Second prize—$3 Camera. Third prize—$2 Camera.

### CLASS H.—CORN JUDGING CONTEST.

This contest will be held during the corn exhibition, and the competition may be entered by an individual, or by a team of three boys.

The prizes are offered by the Rhode Island State College.

Prize for Team work—$15.

Prize for Individual work—$10.

### CLASS I.—FOR BOYS UNDER FOURTEEN YEARS OF AGE.

Lot 1.—*Best Ten Ears of Rhode Island White Cap Flint Corn.* Three prizes—$5, $3, and $2.

First prize given by Tilden-Thurber Co., jewelers and silversmiths, Providence, R. I.

Second prize given by C. W. Willard Hardware Co., dealers in seeds and agricultural supplies, Westerly, R. I.

Third prize given by C. W. & R. M. Bowen Co., physicians supplies, trusses, elastic and rubber goods, Providence, R. I.

Lot 2.—*Best Ten Ears Sweet Corn.*

First prize, $5 in cash, given by Allen N. Hoxsie, dealer in fertilizers, East Greenwich, R. I.

Second prize, $3 pair of shoes, given by C. P. Cornell, dealer in shoes and dry goods, North Main Street, Providence.

Third prize, $2 jackknife, given by J. M. Schmid & Son, dealers in knives and razors, Westminster Street, Providence.

Lot 3.—*Best Ten Ears Pop Corn.* One prize—$4.

### CLASS J.—SPECIAL EXHIBITS AND PRIZES.

Lot 1.—*Best Ten Ears Sheffields World Prize Corn.* One prize—$5.

Prize given by Ross Bros. Co., dealers in agricultural supplies, Worcester, Mass.

Seed for this variety may be purchased from Ross Bros.

The prize-winning exhibit is to become the property of the Ross Bros. Co.

Lot 2.—*Best Ten Ears of Bearsfoot Sweet Corn.* One prize—$5, given by W. R. Sharp Hardware Co., dealers in seeds and agricultural supplies, East Greenwich, R. I.

Lot 3.—*Best Ten Ears Sanford Corn Grown on Island of Rhode Island.* One prize—$5, offered by George A. Weaver Co., dealers in agricultural supplies, Newport, R. I.

Lot 4.—*Best Ten Ears Rhode Island White Cap Flint Corn.*

One ton of Stockbridge Corn Manure, given by the Bowker Fertilizer Co., Boston, Mass., divided as follows:

First prize—$\frac{1}{2}$ton; Second prize—500 pounds; Third prize—300 pounds; Fourth prize—200 pounds.

In growing this corn one of Bowkers chemical fertilizers must be used. No other chemical fertilizer is permitted, but it may be supplemented with barnyard manure, if so desired. The amount of barnyard manure and chemical fertilizer to be used shall be decided by each competitor for himself.

The Bowkers Fertilizer Company is conducting a corn growing contest of its own, and boys who can grow an acre or more of corn should write to them for their premium list. Several prizes may be won in this way.

LOT 5.—*Best Ten Ears Yellow Flint Corn.*

One ton of Swifts Superior Brand Fertilizer given by the Swift's Lowell Fertilizer Co., Boston, Mass., divided as follows:

First prize, one-half ton; second prize, 500 pounds; third prize, 300 pounds; fourth prize, 200 pounds.

The Swift's Lowell Company's Commercial Fertilizers must be used in growing the corn for the exhibit.

LOT 6.—Prizes given by the American Chemical Co., Bradley's Fertilizer Works, Boston, Mass. One ton of fertilizer divided as follows:

(a) *Best Ten Ear Flint Corn Any Variety.*—One-half ton Bradley's Complete Manure for Vegetables.

(b) *Best Ten Ears of Dent Corn White or Yellow.* One-half ton Bradley's Complete Manure for Vegetables.

Corn entered for this exhibit must be grown on Bradley's Fertilizer.

LOT 7.—*Best Ten Ears Rhode Island White Cap Flint, Grown With The Rogers & Hubbard Company's Fertilizer.* One prize—$5, offered by Allen N. Hoxsie, agent for Rogers & Hubbard Co.

This exhibit must be accompanied by statement showing the area of the corn plot, amount of fertilizer used, and the yield obtained.

# BLANK NO. 1.

*To be Returned at Once.*

If you expect to enter the Boys' Corn Growing Contest, please fill out and return this blank as soon as possible, in order that you may receive such circulars and instruction about growing corn and making exhibits as are sent out from time to time from the College. Read the premium list carefully, especially the regulations regarding taking part in the contest, given on pages 3 and 4 before filling out this blank.

If you have not a copy of the bulletin on Corn Growing for Boys, issued by the Rhode Island State College and the State Board of Agriculture, kindly make a request for it in the blank space below your signature.

*To the Extension Department, Rhode Island State College, Kingston,*
*Rhode Island.*

GENTLEMEN:—I hereby signify my intention of taking part in the Rhode Island State Corn Growing Contest for Boys, and to enter in the following exhibits, if I succeed in growing the corn required.

| CLASS. | LOT. | DESCRIPTION OF EXHIBIT. (Use one line for each entry.) |
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Name of father or mother or guardian____________________

Post Office Address____________________

Please send me any circulars or other information which you may issue and which may be of help to me in this corn growing contest.

Signature of Applicant____________________

# BLANK NO. 2.

*This Blank must be filled out and returned by everyone who intends to exhibit* not later than two weeks before the date of the opening of the exhibit, to the Rhode Island State Board of Agriculture, State House, Providence, R. I.

If you intend to remove your exhibits at the close of the exhibition, please make a statement to that effect in the blank space above your signature.

A bulletin on corn growing for boys has been issued. If you have not a copy of this, you can obtain one by sending a postal card request to the R. I. State College, Kingston, R. I. If you have not received information in regard to the exact date and place of holding the exhibition, please make a note of the fact in the blank space below your signature.

Before sending in this blank, please read the rules and regulations on pages 3 and 4 carefully.

RHODE ISLAND BOYS' CORN GROWING CONTEST.

Please enter me for the exhibits hereinafter named:

| CLASS. | LOT. | DESCRIPTION OF EXHIBIT. (Use one line for each entry.) |
|---|---|---|
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Signature____________________

Post Office____________________

Date____________________

State of Rhode Island and Providence Plantations.

Joint Bulletin of the Rhode Island State College and State Board of Agriculture.

EXTENSION BULLETIN

Published monthly by the Extension Department, Rhode Island State College, and entered at Kingston, R. I., as 2nd class matter.

VOL. 1. KINGSTON, R. I. MAY, 1911, NO. 3

# HOW TO GROW CORN.

## RHODE ISLAND BOYS' CORN GROWING CONTEST
## AND
## STATE EXHIBITION OF CORN.

**Abstract from Report of State Board of Agriculture for 1910.**

PROVIDENCE:
E. L. FREEMAN COMPANY, STATE PRINTERS
1911.

Plate I. Some Prize Winning R. I. Corn Grown by E. W. Theinert, Albion.

# PREFACE.

To the Rhode Island Boys:

For a number of years the boys in many western and southern states have had corn growing contests and have been winning handsome prizes. Besides this and far better, they have learned to grow more corn per acre than their elders; how to do something useful and profitable; how interesting farm work is; and they have had helpful, delightful, outdoor summer work.

You Rhode Island boys are as bright and active as any in the country, and there is no reason why you should not carry on similar contests in this State.

The Rhode Island State College at Kingston, in coöperation with the Commissioner of Education, State Board of Agriculture, Normal School, Horticultural Society, and other organizations, has, therefore, made arrangements for such a contest. A premium list has been issued, and this bulletin by Mr. Ernest K. Thomas on Corn Growing is intended to help you make the most of the plan.

Corn is chosen for the contest because it is one of our most important agricultural products. It is easily raised and can be made very profitable, if well grown. The growing of it will also teach valuable lessons in better methods of farming, and intelligent culture will give handsome returns for extra time and thought expended.

We want every boy in the State who can get the use of a piece of land, and who has a little hustle and red blood in him to enter this contest. The prizes are well worth working for, and besides this, the fun and valuable experience which any boy can get out of the contest, will be well worth the effort.

We hope to develop this work in the future with more prizes and medals; also to have contests in other things besides corn growing. Among the things which we want another year is a nice banquet for all those who make exhibits. In order however, to enlarge the work in the future, you boys must take hold and make it a success this year.

Your attention is called particularly to the competition in writing essays on corn growing and to the corn judging contest. Every boy growing corn should enter these competitions.

Read this bulletin carefully. It will give you many suggestions, not only for growing, but also on how to judge corn and how to take notes on the work. We shall be glad to hear from any of you who enter the contest, and to give suggestions from time to time. Remember, therefore, to send us your name and address as soon as possible. If you have any questions about corn growing or in regard to the corn contests which are not answered in this bulletin or in the Premium List, kindly write us and we will try to give you the desired information.

Boys of a grange, school, or community should form a Boys' Corn Growing Club. It will help you very much to get together and talk over plans and methods. Bankers, merchants, millers, and men in other lines of work, form associations for mutual helpfulness, and you can do the same with profit. And, finally, by forming a club, you can compete for the club prizes.

No matter where you live or whether you take part in the contest or not, try to come to Providence to see the exhibition. If you don't make an exhibit, it may make you wish you had when you see what other boys have done; nevertheless, we want you to come. Speak to your parents about this at once. If you cannot come this year, send in an exhibit anyway and you may win a prize; and then, perhaps you can come next year.

We have already been asked what we are going to do for the Rhode Island girls. We have not the money to carry on contests for girls this year, but if this boys' contest in successful, we will try to have something for the girls another year.

Yours sincerely,

A. E. STENE,

*Superintendent of Extension Work.*

# HOW TO GROW CORN.*

ERNEST K. THOMAS.

## HISTORY.

Indian corn or "maize" is an American plant. It was not known in Europe before the discovery of America. "When Columbus landed in the West Indies, the natives gave him a sort of bread made from a grain they called 'mahiz.' In his letters to Spain he spoke of the Indian corn under this name and from it has come our English word 'maize.' "†

The Indian methods of growing corn were of the crudest nature. A few scratches were made in the soil with a stone digger and the kernels dropped in. The crop was then left to take care of itself.

The yield of corn when treated in this way would be very small, but when carefully selected seed is planted in a well-prepared soil, as is done by many successful farmers today, the yield is considerably increased.

## SOIL.

Indian corn requires a good soil. It will not pay to plant this crop on poor land. The soil must be rich enough to enable the stalks to make a maximum growth, otherwise the best yield of ears will not be obtained. Clay soils or wet, undrained areas are not suitable for corn growing. A deep, well drained loam of good texture that will absorb and retain a maximum supply of moisture is a desirable situation for Indian corn.

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*Acknowledgment is made to Prof. A. E. Stene, Superintendent of the Extension Department of the R. I. S. College, under whose direction this bulletin has been prepared, for many valuable suggestions, also to Dr. H. J. Wheeler and Mr. S. C. Damon and their assistants in the agronomy department of the Experiment Station, Kingston, R. I., for many courtesies. In preparing this Bulletin suggestions have been gathered from numerous bulletins and publications to which the writer gratefully acknowledges his indebtedness.

ERNEST K. THOMAS.

†F. L. Sargent, Corn Plants.

### ENRICHING THE SOIL.

Indian corn needs a good deal of plant food. If your soil has been heavily cropped, apply broadcast, preferably in the fall and winter, a dressing of barnyard manure at the rate of eight or ten tons to the acre. By this method the soluble portions are well distributed and absorbed by the soil.

If good sod land is to be used, there may be enough food contained in the organic matter and the manure to supply the needs of the crop, but if the soil has been heavily cropped, the following mixture should be harrowed in:

| | For 1 acre. | For 1-2 acre. | For 1-10 acre. |
|---|---|---|---|
| Acid phosphate. . . . | 500 lbs. | 250 lbs. | 50 lbs. |
| Muriate potash . . . . . | 200 " | 100 " | 20 " |

Lime is useful in aiding the decomposition of the organic matter, and in keeping the soil sweet and free from injurious acid substances. Soil should be limed once in four or five years at the rate of from 1,000 to 2,000 pounds to the acre.

On light, sandy soil the above mixture should contain nitrogen to give the plants an early start, and to supplement the supply contained in the barnyard manure. On such soils the following mixture may be applied instead of the formula mentioned above.

| | For 1 acre. | For 1-2 acre. | For 1-10 acre. |
|---|---|---|---|
| Nitrate of Soda. . . . | 150 lbs. | 75 lbs. | 15 lbs. |
| Acid phophate. . . . . . | 500 " | 250 " | 50 " |
| Muriate potash . . . . . | 200 " | 100 " | 20 " |

One half of this may be broadcasted, the other applied in the drill when planting.

### PREPARING THE SEED BED.

The method of preparing the seed bed will vary with the nature of the soil. Seeds will not germinate evenly if the seed bed is lumpy and rough. It should be friable and well pulverized.

A heavy clay soil should be plowed in the fall, providing the land is fairly level and there is no danger of the soil washing away during the winter. Many insect enemies that hibernate in the soil and noxious weed seeds will be destroyed, or their vitality very much weakened through exposure. The sun, air, and frosts during the winter months will mellow the soil and render the plant food available to the crop the following spring.

Corn needs a deep soil. In the fall the land may be plowed much deeper than it would be safe to plow in the spring. In the latter season, plowing should not be deeper than previous plowings, or at least only a little deeper,—not more than one inch in any one year. If the land is plowed several inches deeper in the spring than it has ever been plowed before, a body of cold soil will be brought to the surface in which the plants may fail to grow. If the soil is deepened in the fall, however, the action of the weather in freezing and thawing will improve the physical condition and render the plant food in it available for the use of the crops in the spring.

The proper depth to plow will vary with the different classes of soil. In general, a very loose, sandy soil should be plowed shallow, and a stiff clay soil, deep. A loose, sandy soil needs packing to check evaporation, and to secure enough moisture from below, through capillary attraction, to meet the needs of the germinating seeds. A heavy soil needs the opposite treatment. It should be opened up deeply in the fall so that the sun and air may sweeten it and the frosts of winter pulverize it.

Plowing should be done at the proper time, that is, when the soil is in the best condition. Never plow a heavy clay soil when it is wet. It will run together and form large lumps when it dries, which will allow the moisture to escape, and will never make a satisfactory seed bed.

Spring or fall plowed land should be disked before planting to help the soil to warm up, and pulverize the large clods. If the soil is heavy, any lumps will be broken up by the disk harrow, thus preventing large air spaces which would dry out the seed bed. The disking will help to pack a loose, sandy soil.

After disk harrowing, the commercial fertilizer should be applied and harrowed in with a smoothing harrow. The seed bed would then be in the best possible condition.

### PLANTING.

Corn should not be planted too early. A late frost or cold weather may check the growth and the yield will be much less than if the seedlings had grown without a check. About the second week in May will be soon enough in Rhode Island.

The depth of planting varies with the kind of soil. In heavy soils do not plant so deep as in light, sandy soil. From one and a half to three inches is about right, depending on the character of the soil.

Use a good seed planter and be careful to make the rows perfectly straight. Drop five or six kernels in each hill. Later if all the kernels grow, thin to three or four. The hills should be three feet six inches apart each way.

The planting may be done by hand. The gentleman who won the grand prize for the best yield of corn from one acre at the New England Corn Show last year says: "Next year I am going to take a piece of board twelve inches square and drive in five pegs, one at each corner and one in the center. A little handle will be put on and a man will go over the field placing this down at the intersection of the marks made by the corn marker, which will be previously run over the field. This will provide five, small holes in the soil, into each of which a single kernel will be dropped. With thoroughly tested seed, this will mean a stand of five stalks to the hill, all at regular intervals. I believe the extra labor will more than pay."

### CULTIVATION.

There is no more important operation in the growing of corn than proper cultivation. Weeds are removed and the moisture in the soil is conserved for the use of the plant and not allowed to evaporate into the atmosphere.

Weeds take out of the soil much the same kind of food that the corn plant requires, and they usually get the lion's share if allowed to grow. Keep down the weeds at first by the use of weeders and harrows or by rakes and hoes if the plot is small. When the corn becomes too high for the harrows, the surface soil should be stirred with a cultivator or by hoeing. Care should be taken not to cultivate too deep. If the roots of the corn plant are injured, the yield may be very considerably reduced.

The soil should be cultivated as often as is necessary to maintain a loose layer of soil over the surface of the corn field. Never allow the soil to become baked and hard. If the ground becomes crusted and hard, it will allow the soil moisture to pass into the atmosphere, and cultivating a soil in that condition will hasten rather than check evaporation, because the soil will break up into lumps. If for any reason the soil has become hard and crusted, it is best to put off the cultivation until after a rain.

A rain will destroy the surface mulch, and just as soon as the soil is dry enough after the rain, it should be renewed.

### CROSS POLLINATION.

Before the kernels will form in the ears, pollen from the tassels must fall on the silk of the ear. This is called pollination. Experiments prove that when the ear is fertilized with pollen from the same plant, the yield, and eventually the ear and stalk grown from seed so produced will tend to decrease. Nature prevents this to a certain extent, because the pollen and the silks mature at different

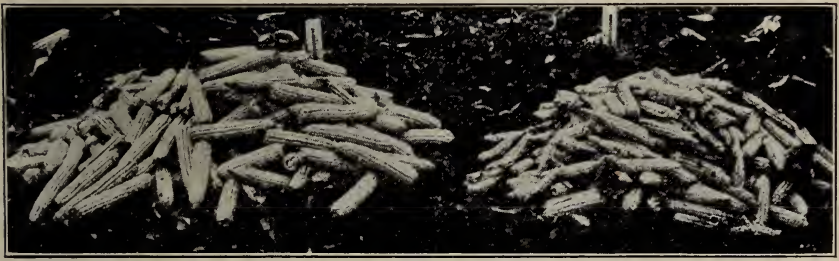

Fig. I. Injurious effect of self pollination shown in pile on right.
(After Hartley and Weber, Farmers' Bulletin, No. 209, U. S. Dept. of Agriculture.)

times on the same stalk, so that the pollen from one stalk fertilizes the silks of another plant. Fig. I. shows the difference in yield between self and cross pollination.

Indian corn produces an abundance of pollen, which takes up a good deal of the strength of the plant. If the tassels are removed just as soon as they are formed, thus conserving the strength of the plant, and making cross pollination a necessity, the ears on such detasseled plants are likely to be better developed than the ears on the stalks not so treated. If every other row is detasseled, there will still be plenty of pollen to fertilize the whole plot. Always remove the tassels from weak, dwarfed and poor plants, and especially from those which do not bear ears, whether they are in the row to be detasseled or not. This will prevent the ears being fertilized by pollen from undesirable stalks.

## SELECTING AND SAVING SEED.

Every corn grower should have a well defined plan of selecting ears for the exhibition, and for seed the following year. By careful selection a strain can be improved in production from year to year, and at the same time adapted to the local soil and climatic conditions. A good variety or strain for one section may not be the best for another, on account of differences in soil and climate. There is an excellent opportunity, therefore, for a progressive corn grower to work up a strain adapted to his section, and to sell the seed to his neighbors at a good price.

The only satisfactory method of selecting seed corn is the one that takes into consideration the whole plant. "Experiments conducted by the United States Department of Agriculture have demonstrated that important stalk characters, such as height of ear, character of root growth, quantity and width of foliage, number of suckers, number of ears per stalk, etc., are transmitted in a marked degree. It is, therefore, necessary to select seed ears from stalks that are well developed, and this can be done only by selecting from standing stalks at ripening time."

### DESIRABLE CHARACTERS IN THE CORN PLANT.

A good corn plant should possess the following characters:

1. Ability to mature ears during the period in which the local situation is usually free from frosts.

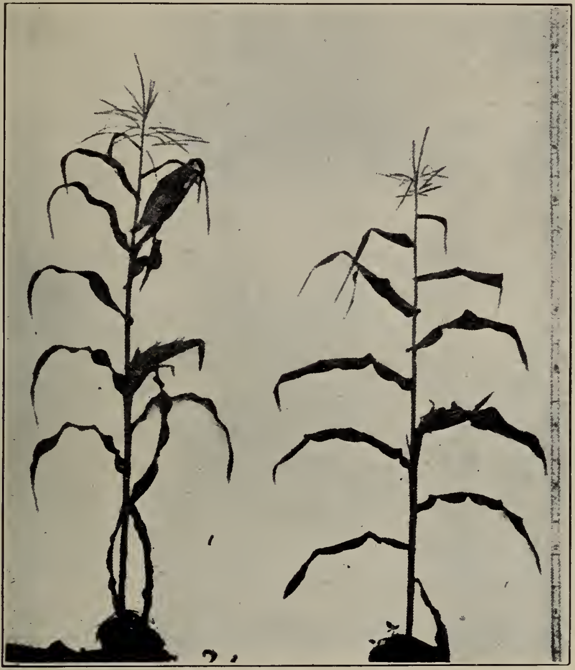

FIG. 2. Desirable stalks.
(After Hartley and Weber, Farmers' Bulletin, No. 209, U. S. Dept. of Agriculture.)

2. As a long season of growth is conducive to a greater yield, the strain should not mature too early. It should require all of the good growing weather usually expected in the locality.

3. The stalks should be strong and thick at the base, not too tall, and free from smut, suckers, and off-shoots. The leaves should be healthy and of a good color, and the whole plant taper slightly towards the top. See Fig. 2.

4. The ears should have medium sized shanks which allow the ear to maintain an angle on the stalk, which will prevent the rain

from getting at the kernels. Avoid plants which have the ears high up on the stalk, or near the ground; the former tend to late maturity, the later to early maturity.

5. The ears should be selected from a uniform height, just below the middle joint on the stalk. This will facilitate fertilization, and the ears may be gathered more rapidly and with less expense.

### DESIRABLE EAR CHARACTERS.

1. The ears should be cylindrical in shape, or nearly so, and well-rounded at each end. See Fig. 3. If they taper very much towards the tip, the kernels are likely to be smaller, or some of the rows of kernels will be dropped near the tip. This means a decrease in yield. Avoid an extremely large ear if it is not mature. Do not sacrifice maturity for size.

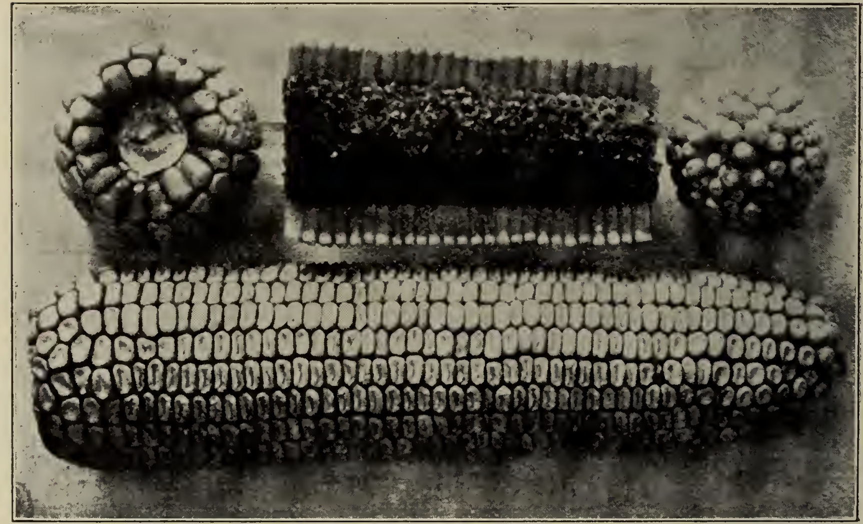

FIG. 3. Ears showing desirable characters, good butt and tip. Kernels upright on the cob. Cylindrical in shape.
(After Hartley and Weber, Farmers' Bulletin, No. 209, U. S. Dept. of Agriculture.)

2. Butts should be well filled out with full depth kernels. There should be no extra rows at the butts. Too large or too small butts

should be avoided. The yield per acre is increased considerably by good butts and tips.

3. Tips should be well covered with kernels of uniform size. The kernels on the tip should be the continuation of the rows on the ear.

4. There should be no spaces between the rows of kernels, nor between the kernels themselves. Wide spaces denote immaturity and reduce the proportion of shelled corn.

5. The cob in white corn is usually white, and red cobs are preferred in yellow corn except in white cob varieties. The cob should be of medium size. If small, the number of rows of kernels is restricted; and if too large, the proporton of corn to cob is reduced.

### DESIRABLE KERNELS.

1. The kernels should be of such form as to fit compactly together on both sides and edges.

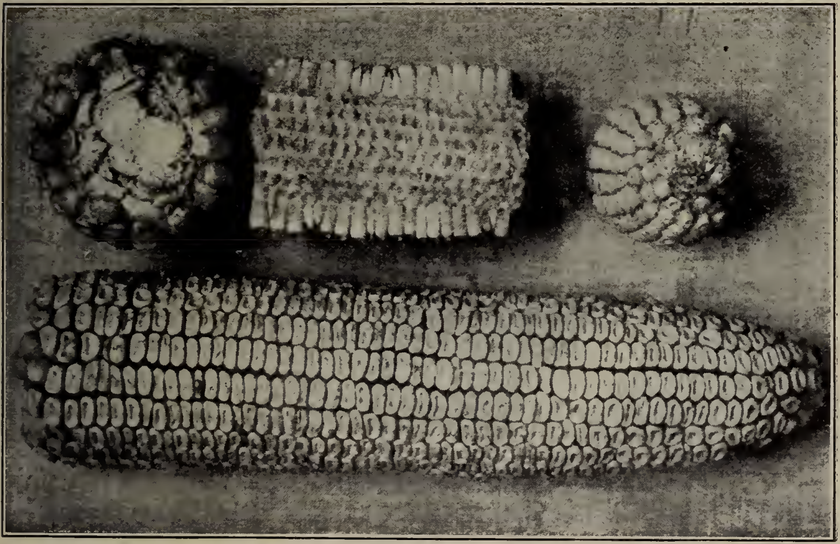

FIG. 4. Ears showing undesirable characters. Poor butt and tip. Irregular kernels, tapering ear.

(After Hartley and Weber, Farmers' Bulletin, No. 209, U. S. Dept. of Agriculture.)

2. They should be of uniform length and shape, broad and deep, with the crowns uniformly rounded. See Fig. 5.

3. Kernels should stand upright on the cob, and the rows should be straight. See Fig. 3.

4. The germ should be plump and give every indication of ability to grow.

5. Different colored kernels on the same ear should be rigidly avoided. It shows poor breeding and variation.

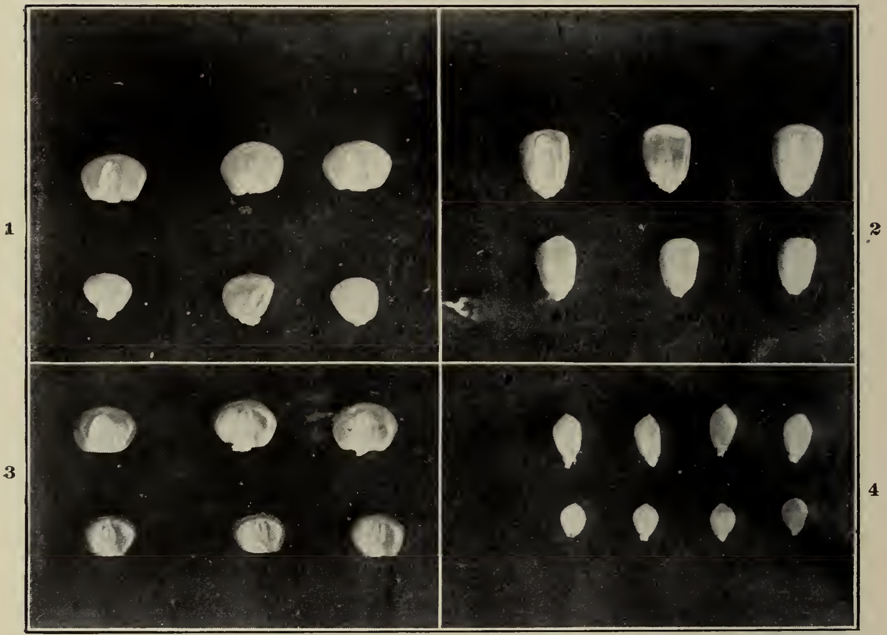

Fig. 5.—Good and Bad Kernels. The upper row of each variety shows good form and the lower poor form of kernels. 1. Rhode Island White Cap. 2. Reid Yellow Dent. 3. Longfellow. 4. Rice Pop Corn.

### MATURITY.

1. Bright color indicates that the corn is well matured. Dull, dead color shows immaturity and lack of vitality.

2. A rigid cob also indicates maturity.

### SELECTING CORN FOR THE EXHIBITION.

When selecting corn for exhibition purposes the first and most important point is uniformity, that is, the ears should be as near alike as possible. The kernels, the size of the cob, number of rows, length of the ears, color, etc., should be uniform in each ear exhibited. Select fifty of the best ears and lay them out on a table, and from these pick out ten ears which are nearest alike, and which measure up to the standard of perfection which you have in mind. Look over the notes on desirable characters, page 11, and the score card, page 25 when selecting for exhibition.

When selecting ears for exhibition or for seed in the field, keep in mind the ideal or standard type, and pick many more ears than you require for either purpose. Time should not be taken in the field to see that each ear possesses all of the desirable characters mentioned above. The final selection should be made later.

Do not include in your exhibit one ear that is an inch or more shorter than the others, nor one that is as much longer. The ten ears should be all the same color, and the rows of kernels straight, not twisted in all the ears. It is best to exhibit ten ears all alike, even if they are not the best, than to include one ear very much better or worse. If an extra good ear is found, use it for a single ear exhibit.

### CARE OF THE SEED CORN.

In Rhode Island we are likely to get freezing weather very soon after the corn has matured. Ears intended for seed or exhibition should be protected from frost. When first gathered, they contain considerable moisture and their vitality may be injured if allowed to freeze or heat. The ears should be stored in a dry room, where they will be free from mice and rats, and where they will not be

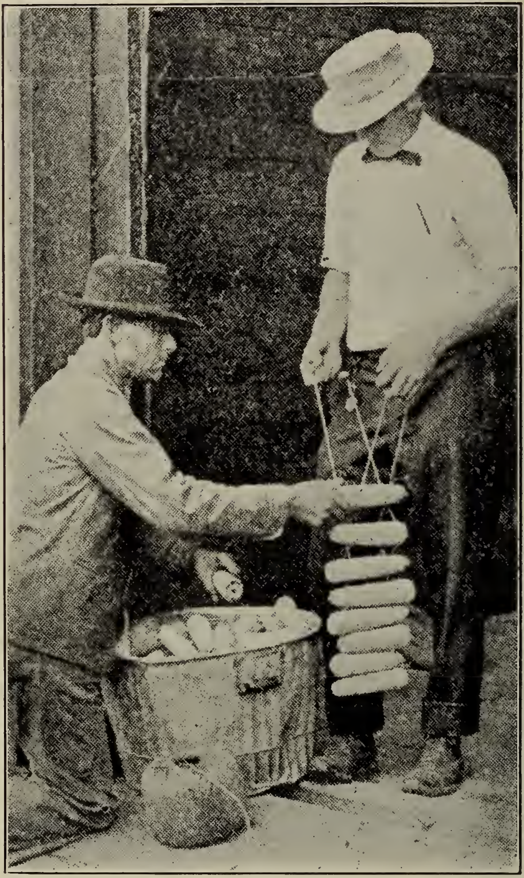

FIG. 6. A good method of hanging up seed corn so it will dry out readily. (After Bulletin No. 9, Extension Division, University Farm, St. Paul, Minn.)

reached by damp air. If it is necessary to use artificial heat to prevent freezing and dampness, care should be taken to use it in connection with a good supply of dry air, that is, there should be ventilation to carry off the moist air.

One of the best methods of storing seed corn is shown in Fig. 6. The ears are supported from the roof with twine, or special racks may be made. See Fig. 7. An attic where a chimney goes up through is usually a good place to store seed corn. If the corn is well matured, and carefully stored after harvesting, one may expect practically every kernel to grow, but if it is exposed to unfavorable conditions, the vitality may be weakened or lost altogether.

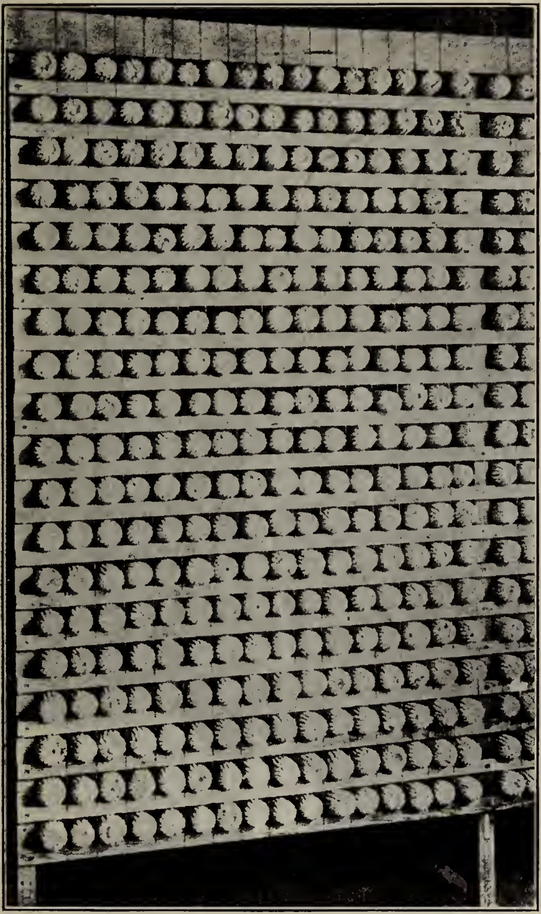

FIG. 7. A good rack for drying seed corn.
(After Hartley, Farmers' Bulletin, No. 415, U. S. Dept. of Agriculture.)

It is a good plan to test the vitality or ability to grow early in the spring before it is time to plant. It has been estimated that every poor ear of corn planted spoils about one-fifteenth part of an acre in the corn field.

### HOW TO TEST THE VITALITY.

The following method of testing seed corn is taken from Farmers' Bulletin, No. 409, U. S. Department of Agriculture.

The only materials needed are a shallow wooden tray, a few tacks, twine and sand. The trays can be made from old soap boxes. They should be about 1½ inches deep, 15 inches wide, and 23 inches long; but any of these dimensions may be varied slightly. This tray is divided into small squares by a checkerboard lacing of twine across the top. It is convenient to have these squares about 1½ inches on a side, ten of them in a row across the narrow way of the tray and fifteen the other way. Fig. 8 shows the general appearance of such a tray and the method of lacing the twine back and forth across the tray and under the tacks. The lacing with the string should not be done until the tray has been loosely filled with dry sand, heaped up a little above its top edge. Then with a straight edge, remove the sand even with the top of the tray. After lacing with the string the tray is ready for planting.

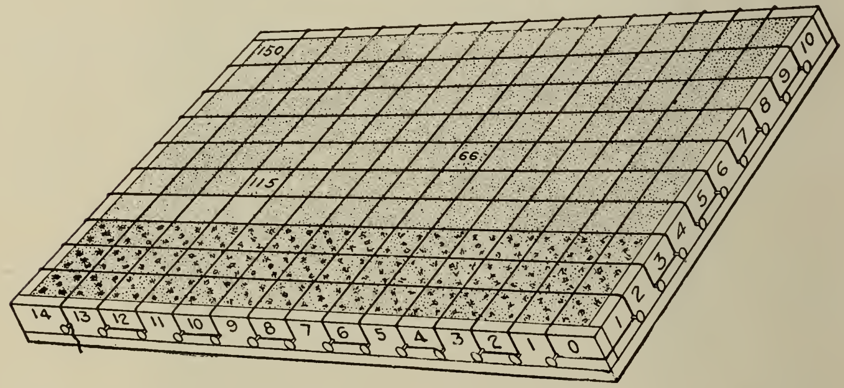

FIG. 8. A sand tray for testing seed corn.
(After Crosby and Howe, Farmers' Bulletin, No. 409, U. S. Dept. of Agriculture.)

The ears to be tested should be arranged in rows of ten, to correspond with the rows of squares across the tray. These ears should be kept in a dry, warm place where they will not be disturbed until the test is over. A nail may be driven into a shelf or the floor at the end of a row of ten ears to keep them in place.

When everything is ready, take up ear No. 1 in the first row, and with the point of a pen knife applied to the edge of the kernels, remove five from the first ear, and carefully replace it in its row. Kernels of average size should be taken in succession from an inch above the base of the ear to the same distance below its tip, passing spirally around and lengthwise of the ear. This insures a fair test of the whole ear, as it sometimes happens that one side or one end of an ear is sound while the other will not grow. Fig.11 shows a few ears with the kernels removed in this spiral fashion.

Plant the five kernels in the square which corresponds with the ear from which they were taken. Place one in each corner and one in the center, point downward, just deep enough to be covered with the dry sand when the forefinger is withdrawn. All the kernels should have a uniform depth below the surface of the sand. Fig. 8 shows the first three squares planted in each of the fifteen rows.

When the tray has been planted it should be watered by laying a piece of paper over the sand and pouring the water carefully on this until the sand is fully saturated. Never allow the tray to dry out until the test is over. Place the tray in a warm room where the temperature will be fairly constant. Sometimes the corn roots will force the kernels

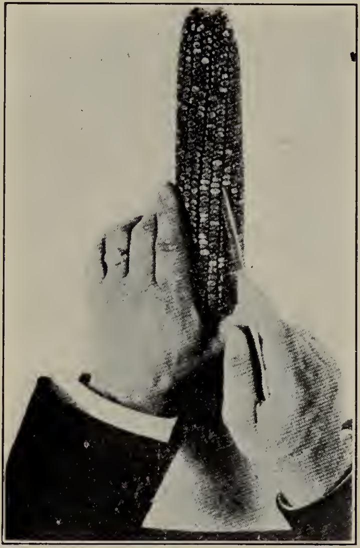

Fig. 9. The right way to remove kernels. Insert knife between the rows and pry side ways.

(After E. C. Bishop, Bulletin No. 9, Dept. of Instruction, Lincoln, Neb.)

out of the sand. When this happens they should be covered again by sprinkling some damp sand on them.

When the plants are about two or three inches high, carefully examine every square from the first to the last. If there are five sturdy plants growing in a square, the ear from which they were taken is all right for planting in the field.

If there are five plants in the square and two of them are shorter than most of the others in the tray, or look pale and sickly, take at once the ear from which they came out of its row and do not let it get mixed with those that are to be shelled for planting in the field.

If one kernel out of the five in any square has not begun to grow at all, while the rest from the same ear are an inch or two high, it will not be safe to plant kernels from the corresponding ear, and it should be discarded. Every poor ear planted spoils about one-fifteenth part of an acre in the corn field.

Until the test is finished, it is very important to keep the ears in place, so that the one corresponding to any square in the tray can be picked out at once. If the ears are not laid in rows of ten they must be numbered in some other way. The number of any square is easily known by referring to the way the tray is numbered in Fig. 8. Thus, space 66 is the sixth square in the row numbered 6, and the number of any square in the tray is determined by this simple rule: Consider the number marked at the left end of any row as tens, and add to this the unit number representing the

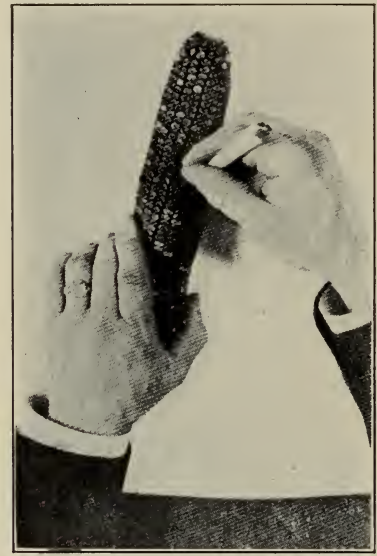

Fig. 10. The wrong way to remove kernels. By placing the knife between the kernels and prying into the kernel the germ is sometimes injured.

(After E. C. Bishop, Bulletin No. 9, Dept. of Instruction, Lincoln, Neb.)

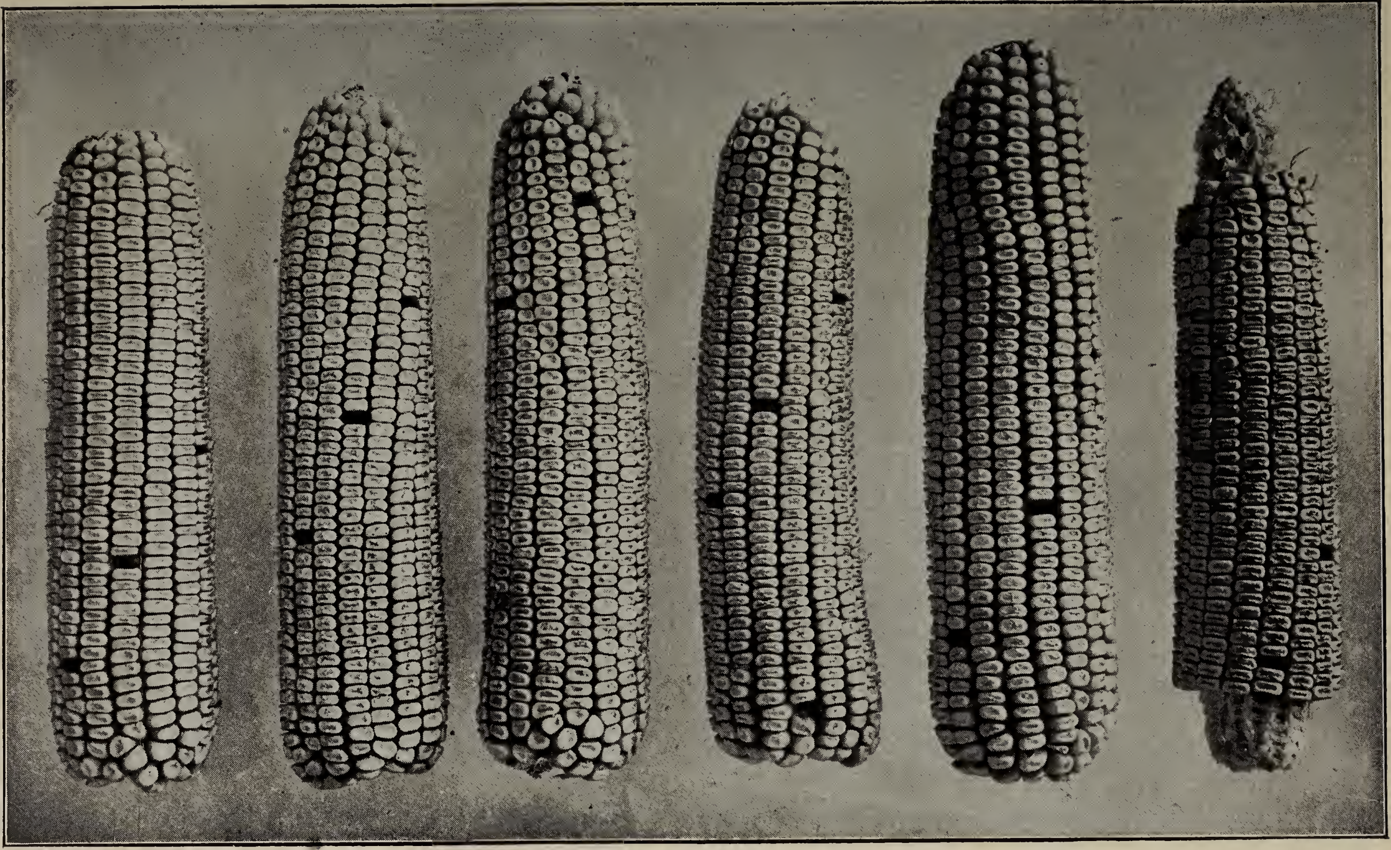

Fig. 11. Ears of corn with kernels removed for testing.
(After Crosby and Howe, Farmers' Bulletin, 409. U. S. Dept. of Agr.)

given square (shown in Fig. 8 at the right end of the tray). Note whether squares 115 and 150 are correctly numbered according to this rule. If the corresponding rows are arranged in 15 rows (calling the first row zero), the number of any ear can be found in the same way. If this plan is not followed, each ear should be tagged and numbered in consecutive order.

Good care must be taken of the seed corn after it is tested. Dampness and freezing will spoil it in a few hours.

Before shelling the tested ears, it is considered advisable to remove the small or irregular kernels for upward of an inch from each end of the ear, (Note the last ear in Fig. 11), as these kernels do not usually germinate and grow at the same rate as those in the middle of the ear.

When purchasing seed corn always insist upon having it unshelled, that is, on the cob, so that the germination test can be made. Buy from a reliable corn breeder whose methods of corn breeding are known in the locality. Never buy a large quantity of corn from a distance, unless it has been grown in the neighborhood for some time and found satisfactory.

## THE AREA OF CORN PLOT.

The amount of land to be used is left entirely with the competitors. In many cases back yards will have to be used, but this need not bar anyone from competing. Some prize corn was grown last year in a small backyard garden.

A boy may grow only one hill of corn and produce the best ear in the show. Of course, the larger the area the more there is to select from.

The following table may assist in making an estimate of the area of the corn plot.

| | | |
|---|---|---|
| 208 feet 9 inches | x 208 feet 9 inches | 1 acre. |
| 220 feet | x 198 feet | 1 acre. |
| 440 feet | x 99 feet | 1 acre. |
| 110 feet | x 396 feet | 1 acre. |
| 60 feet | x 726 feet | 1 acre. |
| 180 feet | x 121 feet | $\frac{1}{2}$ acre. |
| 200 feet | x $108\frac{9}{10}$ feet | $\frac{1}{2}$ “ |
| 100 feet | x $108\frac{9}{10}$ feet | $\frac{1}{4}$ “ |
| 121 feet | x 36 feet | $\frac{1}{10}$ “ |

Area of one acre:

10 square chains = 1 acre.
160 square rods = 1 acre.
4,840 square yards = 1 acre.
43,560 square feet = 1 acre.

### PURCHASING THE SEED.

The seed corn should be purchased from reliable seedsmen or growers who make a point of furnishing varieties adapted to Rhode Island conditions. Do not send away long distances west or south for seed.

It may not be suitable for New England conditions. Find out from the farmers and gardeners in your section what varieties to grow.

### CAUTION.

Do not plant more than one variety in the same plot. If more than one variety of corn is grown, they should be a considerable distance apart, otherwise the pollen from one variety will be carried by the wind and fertilize the other. The result will be mixed kernels, and ears useless for exhibition purposes. See page 9.

## PREPARATION OF EXHIBITS.

When harvesting stalks for Class C—BEST TEN STALKS WITH EARS, cut them off as near the ground as possible. Look over the notes on desirable stalks and ears, pages 11 and 12. Keep them in a dark, well-ventilated room until ready for packing.

The best way to pack the stalks for the exhibition is to secure them firmly to a stout pole two or three inches in diameter by means of strong twine. Then wrap with burlap, and ship by freight to the hall, charges prepaid, unless some other means of transportation is available.

Ears of corn for the other classes should be made to present the best possible appearance by husking, removing all silks and shank; but the ear itself should not be injured in any way. Discolored kernels must not be removed and others substituted. Secure ears without discolored kernels if possible.

Handle the ears carefully and pack each one separately in newspaper, and place them in a mouse-proof wooden box. Care must be taken to pack the box firmly to prevent the ears shifting about and knocking off some of the kernels.

If the exhibit is to be sent to the hall, the exhibitor's name and address, and class in which it is entered, should be plainly written on a card and placed inside the box. A similar card should be sent with the exhibit of stalks and ears.

# BOYS' CORN JUDGING CONTEST.

## SCORE CARD.

| | Perfect Score. | Perfect Score. | Boys' Score. | Corrected Score. | Boys' Score. | Corrected Score. | Boys' Score. | Corrected Score. | Boys' Score. | Corrected Score. | Boys' Score. | Corrected Score. | Boys' Score. | Corrected Score. | Boys' Score. | Corrected Score. | Boys' Score. | Corrected Score. | Boys' Score. | Corrected Score. | Boys' Score. | Corrected Score. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POINTS. | Dent. | Flint, | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | |
| Uniformity........ | 15 | 15 | | | | | | | | | | | | | | | | | | | | |
| Maturity and Seed Condition....... | 25 | 20 | | | | | | | | | | | | | | | | | | | | |
| Kernels........... | 15 | 15 | | | | | | | | | | | | | | | | | | | | |
| Weight of Ear..... | 15 | 10 | | | | | | | | | | | | | | | | | | | | |
| Length and Proportion............ | 10 | 10 | | | | | | | | | | | | | | | | | | | | |
| Butts............. | 5 | 10 | | | | | | | | | | | | | | | | | | | | |
| Tips.............. | 5 | 5 | | | | | | | | | | | | | | | | | | | | |
| Space between rows | 5 | 10 | | | | | | | | | | | | | | | | | | | | |
| Color............. | 5 | 5 | | | | | | | | | | | | | | | | | | | | |
| Totals.......... | 100 | 100 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

### HOW TO USE THE SCORE CARD.

All the ears to be judged will be in ten-ear lots and numbered 1 to 10. When scoring, put down the points for ear one in column one, under "Boys' Score," not under "Corrected Score." Continue this until ear number 10 has been scored. When the last ear has been scored for the different points, add them together for each ear, and write the total in the last row. Now to find the average number of points for the ten ears, add the totals together and divide by ten, taking care not to include the two first totals. The figures in the first two columns show the number of points that should be given for a perfect ear of Dent and a perfect ear of Flint corn.

Now suppose Ear No. 6 has nearly perfect kernels, mark in column number 6, in the third line, and under "Boys' Score" say 14 points. Each ear should be carefully examined and the different points taken up in succession. The figures in the first two rows are maximum points and should not be given unless the ear is considered perfect in every way.

Uniformity means the general appearance of the ears. If the ten ears seem to be uniform, all about the same length, etc., mark in each column 1 ½ points. This will give for the ten ears the maximum 15 points. If any ear is conspicuously out of proportion in any of the points, compared with the others, do not mark that ear anything on uniformity. The column under corrected score is for the judges. They will correct any figures, if it seems necessary, and show each competitor where he made a mistake.

## HOW TO APPLY THE POINTS OF THE SCORE CARD.

(1) *Uniformity*—In a ten-ear sample, the ears should look alike. They should be similar in shape, size, length, color, indentation of kernels. The tips and butts should be equally well filled on all ears, and covered with kernels of the same size and shape. Uniformity of kernels is very important when planting with a machine. For each ear differing in any of the points mentioned, cut from ½ to 1½ points.

(2) *Maturity and Seed Condition*—Seed corn is worthless if it will not grow. Good seed is indicated by freedom from mould, and brightness of color. Ears should be solid and the kernels firm on the cob.

For each ear not perfect in the points mentioned, cut from 1 to 3 points.

(3) *Kernels*—Kernels should be uniform, slightly wedge-shaped, not pointed. The germ should be plump and bright. The kernels should be uniform in thickness, and in straight rows. They should fit closely together on all sides. Space between rows of kernels is very undesirable.

For each ear not perfect in any of the above points, cut from ½ to 2 points.

(4) *Weight of Ear*—Dent ears may weigh 16 ounces or more. Flint ears 7 to 10 ounces. As a rule the ears will not be thoroughly dry at the time of the exhibition, and the weight will have to be estimated. (Assistance will be given each competitor in scoring this point).

(5) *Length and Proportion*—The size of ears will vary with the environment. It is difficult to determine what a type of New England corn is. Dent ears should be 9 to 10 inches long. Flint ears may be 10 to 12 inches long. In Dent, the circumference 2 inches from the butt should be ⅔ the length. Ears with large circumference mature slowly. Nearly cylindrical ears are desirable.

For ears out of proportion, cut from ½ to 2 points.

(6) *Butts*—Too small or too large butts are undesirable. The kernels should be uniform in size and well arranged, and stand out well about the shank, forming a cup-shaped cavity. There should be no extra rows at the butt. The yield per acre is influenced considerably by good or bad butts and tips.

Cut from ½ to 1 point for each defective butt.

(7) *Tips*—A good tip is one covered with uniform kernels in regular rows. Tips well filled out show good breeding. A sharply tapering tip is undesirable. A poor season, such as a dry spell during pollination, may cause poor tips.

Cut from ½ to 1 point for each defective tip.

(8) *Space Between Rows*—Poorly shaped kernels cause the development of space between the rows. It indicates poor breeding,

and reduces the proportion of shelled corn. There should be no wide spaces between the rows, nor between the kernels in the row, either at the crown or at the cob. Immature ears usually have wide spaces.

Cut 1 point from each ear seriously defective in this respect.

(9) *Color*—Kernels should be free from mixture in color and of a bright luster. White or black kernels in yellow corn are undesirable, and vice versa.

The cobs should be of uniform color in the exhibit. Ears with cobs of the wrong color should be cut severely. It indicates poor breeding. Uncertain tints in cob and grain, and off-colored kernels, are evidences of mixing. White cobs in white corn, and red cobs in yellow corn are preferred, except in white cob varieties. Variation in color shows lack of fixity of type and poor breeding. A mixture of white and yellow types should be cut according to the judgment of the scorer. If the mixing is at all conspicuous in any ear, it should not be scored.

### REMARKS.

The Score Card should be used when selecting ears for the exhibition. It is intended to be suggestive, rather than an accurate guide which should be closely adhered to. An expert judge soon learns to do away with any hard and fast lines in scoring corn. After getting the true proportion of the different points, he can naturally judge more successfully without the score card than when bound down by mathematical rules.

## HOW TO ORGANIZE A CORN CLUB.

It is a good plan for the boys in a neighborhood or school to organize a corn growing club. Form a club which shall be known as the (give name) Boys' Corn Growing Club. Elect a president and secretary and send in their names, together with the names and addresses of every member who intends to enter the competitions, to the Extension Department, R. I. State College, Kingston, R. I., also the name and address of the principal of the school, if you attend one.

The club should meet every month to discuss questions relating to the growing of corn or some other interesting subject.

If the organization of a club is not possible, any boy may enter the competition by applying to the State Board of Agriculture, State House, Providence, or to the Extension Department, Rhode Island State College, Kingston.

## SCHOOL EXHIBITS.

A school, or grade, may send in exhibits (See premium list, Class F). Many pupils may be unable to secure land and would like to enter in some of the competitions. The principal may be able to secure the use of a nearby lot, and encourage a few boys to work it among themselves, and enter their exhibits separately, or collectively, and share the premiums, should they be successful.

If there are a number anxious to enter the work, it can be considered a school, or a grade enterprise, if so desired, and the exhibit made in the name of the grade or school. Should such an exhibit be awarded a prize, it will become the property of the school. As with school gardening, this corn growing contest will open up an excellent opportunity for a progressive teacher to do some original work. The other studies in the curriculum, such as language, arithmetic, geography, may be correlated with this work and made more interesting to the pupils on account of their personal interest in the corn work.

# RECORD BLANK.

## TO BE USED IN MAKING NOTES FOR ESSAYS, ETC.

**NAME**........................ **POST OFFICE**........................

**COUNTY**..........................

If this or a similar blank is filled out as the season passes, the data will be in shape for preparing an essay at the end of the season in competition for the prize under class G in premium list.

1. Area of corn plot..................................
2. Character of soil, as clay, sand, loam, etc..................
3. What crop was grown on the same land in 1908, 1909, 1910?..

..........................................................

..........................................................

4. What amount of barnyard manure was applied?............
5. What amount and kind of commercial fertilizer was applied?

..........................................................

..........................................................

6. When were the fertilizers applied?......................

..........................................................

7. When, and how deep was the plot plowed or spaded?....

..........................................................

8. Condition of land at time of plowing.....................

..........................................................

9. How many times was land harrowed?.....................
10. Date of planting. Depth of planting.....................

..........................................................

11. Variety of corn planted...............................
12. Distance apart of hills in rows..........................
13. Distance apart of rows...............................
14. Number of stalks in hill..............................
15. How was plot cultivated, hoes or cultivator?...............

..........................................................

16. Depth of cultivation...................................

17. How many times cultivated..................................

18. Dates of cultivating 1st, 2d, 3d, 4th, etc.................

..........................................................

19. Number of pounds of ears...................................

20. Number of pounds of stover.................................

21. Yield in bushels (Divide total number of pounds of ears by 70)

..........................................................

22. Rent of land at rate of $5 per acre........................

23. Preparation of soil, plowing, harrowing. Figure your own time at rate of 10 cents per hour, and the time of the horse, if one is used, at 10 cents per hour.....................................

..........................................................

..........................................................

24. Cost of planting, figured on same basis....................

..........................................................

..........................................................

25. Cost of cultivation figured on same basis..................

26. Cost of gathering figured on same basis....................

..........................................................

27. Cost of seed...............................................

28. Cost of fertilizer. Add cost of commercial fertilizer used to cost of barnyard manure used. The latter should be figured at $5 per cord. Now charge two-thirds of this amount to cost of fertilizer.

..........................................................

..........................................................

..........................................................

29. Total number of pounds of ears.............................

30. Divide total by 70 to find bushels of shelled corn.........

31. Total number of pounds of stover (stalks without ears)...

32. Value of stover. (Figure at $5 per ton)....................

33. Market value of shelled corn...............................

34. Total value of crop, stover and corn.......................

..........................................................

..........................................................

From the preceding record the following balance sheet can be easily made out:

### EXPENSES.

Rent of land (See 22)................................$
Preparation (See 23)................................
Cost of planting (See 24)...........................
Cost of cultivation (See 25)........................
Cost of gathering (See 26)..........................
Cost of Seed (See 27)...............................
Cost of fertilizer (See 28).........................

---

Total cost...........................................$

### RECEIPTS.

Bushels of corn at market price.....................$
Pounds of stover at market price....................

---

Total value of crop at market price...............$
Less expenses.......................................
Net profit.........................................
Net cost per bushel................................
(Signed).......................................

State of Rhode Island and Providence Plantations.

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Joint Bulletin of the Rhode Island State College and State Board of Agriculture.

# EXTENSION BULLETIN

Published monthly by the Extension Department, R. I. State College, and
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Vol. 1. KINGSTON, R. I. JUNE, 1911. No. 4.

# Children's School and Home Gardening.

" We are Producers."

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Abstract from Report of the State Board of Agriculture for 1910.

PROVIDENCE:
E. L. FREEMAN COMPANY, STATE PRINTERS,
1911.

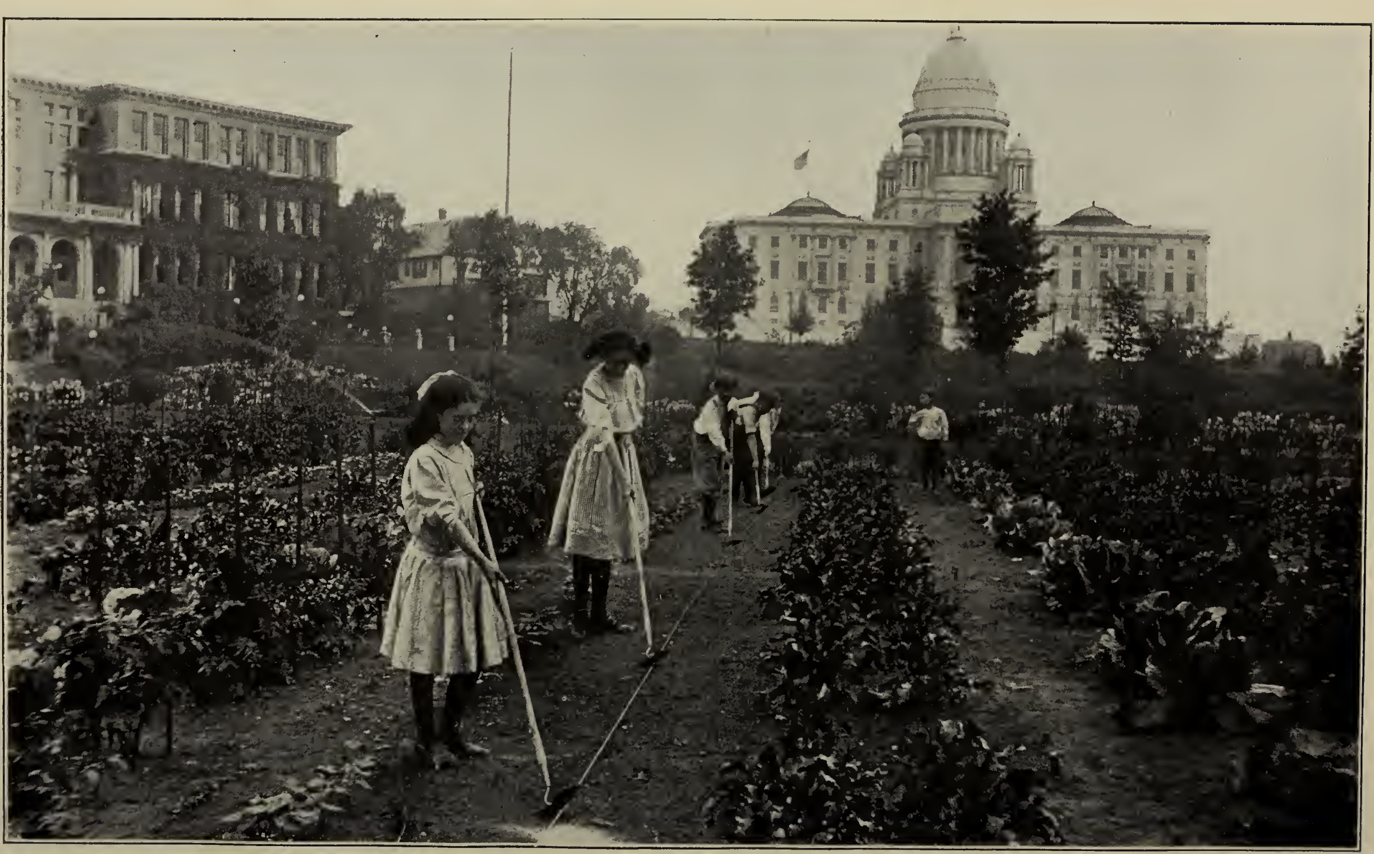

**PLATE I.**—Crops removed from section of garden. Pupils making straight drills for second crops. State Normal School, Providence, R. I.

# PREFACE.

The following account of children's garden work is primarily a report by the Extension Department of the Rhode Island State College, to the President of the College and to the Secretary of the State Board of Agriculture, of work accomplished during the past three years, 1908–1910, inclusive, through the joint financial support of these two organizations and in co-operation with The League of Improvement Societies in Rhode Island, public schools and other organizations. Work in school gardening was done by the Extension Department previous to the period covered by this report, but as a short account of this was given in the early reports of the Department, only brief mention of it will be made here.

This report is divided into two parts. The first part is introductory and contains historical notes and a general outline of present and future plans, together with brief acknowledgments of help given in developing the work. The second part, written by Mr. Thomas and others, gives a detailed report of the work for each year.

A. E. Stene, *Superintendent*,
*Extension Department, R. I. State College.*

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# CHILDREN'S SCHOOL AND HOME GARDENING.

## INTRODUCTORY.

A. E. STENE.

This subject has created considerable interest among educators and social workers during the last few years. It was first brought into prominence in this country through the work of Henry Lincoln Clapp, of Roxbury, Mass., who, in 1891, started communal gardens in connection with his school. Since that time the movement has spread until many cities today have one or more organizations which promote the work, or they have made it a part of the work in connection with their public school departments.

An effort has been made to secure some information regarding the history of the movement in this State, and, so far as can be ascertained, the first work was done by Miss Ella Sweeney, Assistant Superintendent of the Providence schools, about eleven or twelve years ago. Since that time Miss Sweeney has continued the work in connection with a number of the primary schools in Providence. Other cities and towns have begun work since that time. The Civic League of Newport has conducted gardens in connection with schools in Newport since 1906. Westerly schools also started gardens about the same time. In 1906, the Pawtuxet Old Home and Improvement Society started a movement for home gardens, and in 1908 this was attached to the Pawtuxet Grammar School.

When the Extension Department of the Rhode Island State College was established in 1904, one of its functions was to promote school and children's garden work. A small garden was started at the Kingston public school, and aid in the way of instruction was given to the Pawtucket Boys' Club. The latter gardens were continued for three years, the Superintendent of the Extension Department giving his Saturdays during the summer seasons to the instruction work.

Owing to the many lines of endeavor mapped out for the Extension Department and the consequent lack of time the amount of effort that could be devoted to children's gardening was small and it was not until the winter of 1907 and 1908, that the movement gained any appreciable headway. At that time the League of Improvement Societies appointed a committee on children's gardens, of which Mrs. Mary E. S. Root was the chairman. Through her enthusiastic work, a new stimulus was given. The College agreed to add to its work in this line by engaging an instructor for the summer months, and, through the co-operation of the State Board of Agriculture, $300.00 was contributed by this organization towards paying the expenses of the instructor and incidental expenses. President Edwards directed that the Extension Department should have charge of the work for The College, and a plan of development was drawn up similar to that which had been carried out in connection with the gardens of the Pawtucket Boys' Club.

At the instance of the school garden committee of the league, the Park Board of the City of Providence agreed to set aside a piece of land for the purpose of establishing a garden, and a tract admirably adapted for the purpose was found on what is called "The Island" in Roger Williams Park. Oxford, Vineyard, Broad, Lexington, and Peace street schools, all situated near the park, arranged to send children there for instruction.

Meanwhile The College had been endeavoring to find someone who could take immediate charge of the work in the field, and secured the services of Mr. Ernest K. Thomas, a graduate of the Royal Botanical Gardens, Kew England, and at the time of his appointment, connected with the botanical department of the University of Pennsylvania. As the work has well proven, Mr. Thomas was admirably qualified for the task, and the movement has grown so that it is becoming urgently necessary to provide additional help in the instruction work.

In subsequent pages of this report, Mr. Thomas and others will give a more detailed account of the development of the work in the State and further discussion here is, therefore, unnecessary.

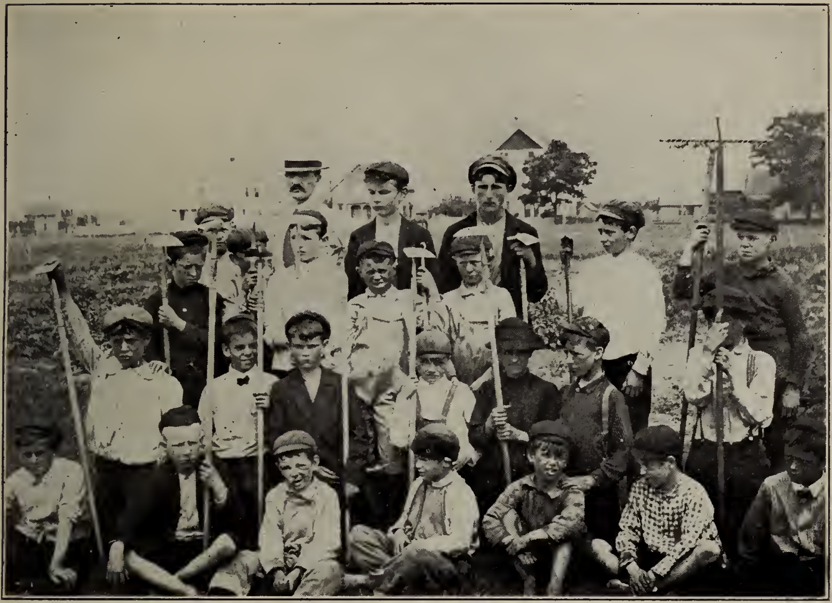

FIG. 1.—"The raw material." Pawtucket Boys' Club.

NOTE.—These boys had the first gardens under auspices of the Rhode Island State College Extension Department after its organization in the summer of 1904.

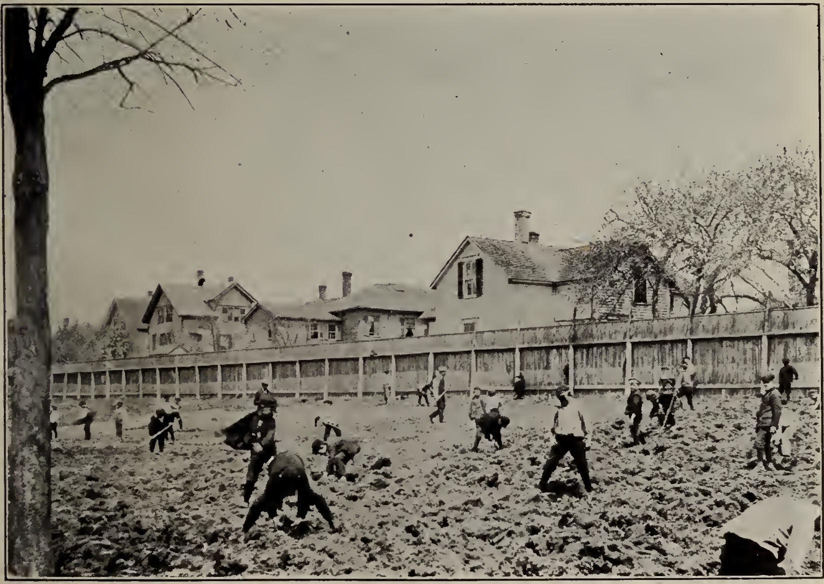

FIG. 2.—Early struggles required courage and persistence. Preparing ground for gardens on newly broken bluegrass sod. Pawtucket Boys' Club.

## Future Development.

As proven by the work in this State and by that in other parts of the country, school gardening has come to stay. In fact, this country is far behind foreign countries in the development of this field of instruction. Many European countries have thousands of school gardens, and the governments of some of the principal nations of Europe have accepted the idea to such an extent that they will no longer permit the formation of new schools unless they have provisions for garden work.

The principles underlying school garden work have been discussed pro and con to such an extent during the last few years that full discussion will not be necessary here. Suffice it to say that educators have become fully convinced that school gardening forms an important part of our educational system, and it is a matter of time only and the providing of necessary funds by the state and local organizations, for the garden work to be introduced into the schools of the country.

From the standpoint of an agricultural institution, such as a land grant college, children's school or home gardening is of vital importance. By virtue of their nature, agricultural colleges are charged, not only with the teaching of agricultural practices, but also with inculcating a better appreciation of agriculture as a vocation and thus lifting it to a higher plane. In the Eastern states especially, it is urgently necessary for the colleges to promote the development of a favorable attitude on the part of the people generally towards agriculture. The prominence of manufacturing interests and the migration westward have conspired to draw from agricultural pursuits a large share of the best blood of the country, and as a consequence, agriculture has fallen in repute. No better way of starting a movement for improved conditions can be found than that of interesting the children in the principles and methods of tilling the soil, and imparting to them a belief in the essential importance of agriculture and a feeling that it is a highly honorable occupation, and when well carried on, a profitable one as well.

The attempt to stem the tide of migration of adults from the country to the city and to encourage the return, perhaps, of some of those who are not doing well in the city is laudable, but for a permanent change favorable to agriculture in our social system, we must begin by teaching the right attitude towards agriculture to the rising generations. There is a field for this garden work not only in connection with the schools, but in the work of various organizations interested in social betterment, and especially, perhaps, among those interested in agricultural development. For this reason it is highly fitting and proper that boards of agriculture, horticultural and florists' societies, improvement leagues, Y. M. C. A.'s, civic associations, men's clubs, boys' clubs and similar organizations, and even churches, should lend their aid in promoting the work.

The history of the work in Rhode Island is a splendid example of what can be done through cooperative effort. The State College, by virtue of its duties and functions and facilities at hand, has perhaps taken a large share in the carrying on of the work so far, but the work has, as already noted, received splendid support from the League of Improvement Societies and the State Board of Agriculture. In addition, the State Horticultural Society has for a number of years offered prizes for excellence in garden work. The present school committee and the superintendent of schools in Providence are heartily in accord with the movement. The normal school has organized classes among its students for the purpose of giving instruction to future teachers. Civic associations and philanthropic clubs, individuals and manufacturing companies are also doing excellent work in many places.

The writer believes that he can speak for the Extension Department of the Rhode Island State College, and for the State Board of Agriculture as well, in saying that they propose to help promote the children's garden movement, so far as funds and their many lines of endeavor will permit, until every locality in the State that can profit by the work shall have been reached. Plans have been outlined through which it is hoped, by the continued inspiration and co-operation of the League of Improvement Societies in Rhode Island, and by the approval and support of the Providence Park Board, the Providence Public School Department, and various public-spirited organizations, to develop in Roger Williams Park, a model school garden which shall embody in every detail, so far as possible, every thing pertaining to a school garden according to the most advanced ideas in regard to such work.

Roger Williams Park is an ideal location for a model garden, since it is centrally located and accessible to teachers and others in the State,—and even many sections of the adjoining States—who may be interested. The ground now devoted to the garden is as near to the ideal as anything which it is likely that we could secure. The growing of certain plants, such as the common vegetables and flowers, has been well illustrated. Trees and shrubs are growing abundantly in and around the garden, a botanic garden of economic plants has been introduced, a small fruit plantation was started last spring, and it only remains to establish a wild, a rock, and an aquatic garden in order to include the essential features of what a school garden should contain according to present-day ideals.

If some plan can be devised through which there could be constructed in connection with this garden, an adequate building with rooms for tools, seeds, and plant storage, and a lecture hall, and perhaps a small green house in which could be illustrated the simple methods of plant propagation, we would feel that we had made a long stride towards our goal in this line of work.

In addition to aiding in developing this model garden, the Extension Department of the College offers help to every school or other organization in the State which desires to undertake the instruction of children,—or grown-ups, for that matter,—in gardening or elementary agriculture.

Among the fields in which it seems to the writer that this work should be of the greatest value is that of mill villages and other manufacturing centers. Too often the dwellings of mill operatives are cheerless and unhomelike. The surroundings, at least, could be entirely transformed by the planting of a lawn and a few shrubs and trees, and the daily fare could be much improved by the addition of fresh garden products, all of which could be accomplished by a little guidance from the outside and a little effort on the part of the operatives themselves. Of still greater importance than these immediate and easily recognized results, however, would be the influence which the added industry, forethought and resultant ameliorated circumstances, and more attractive homes, would have upon the character building of the coming generations.

Schools, churches, improvement societies and philanthropic organizations should give this work careful consideration in connection with their plans, for experience shows that it would be very effective in attaining the goal towards which they are working. Some of the illustrations presented by Mr. Thomas in his report indicate what can be done in this line, and others show that there is abundant opportunity for work of this kind. Assistance will be given gladly, through advice and instruction, as far as time and funds permit, to schools or other organizations, wishing to promote garden work in manufacturing centers.

During the coming year an effort will be made to reach village and city as well as country boys through the establishment of boys' corn growing contests. The work has already progressed sufficiently so that a splendid exhibition is promised for next fall. Another year we hope that this may be enlarged to include contests for girls as well as boys.

In conclusion it should be said that the plans here suggested are only a beginning. The work should be increased in the country as well as in the city. Rural schools can and should be brought into closer touch with the life of their communities through the teaching of gardening or agriculture in their courses, in order that the pupils may not be turned out at the end of their school life with a deficient knowledge of agriculture as a vocation, or of its principles and practices. City children should be taught agriculture as a matter of cultural training primarily, but also to encourage those who are so inclined to take up farming as a pursuit. It is fully as reasonable that the pupils of our public schools, even though they do not intend to be farmers, should know as much about the food products of their own country, many of which are produced within a few miles of their homes, as they are required to know about the productions of other countries, and when it comes to a question of importance, it will be

PLATE III.

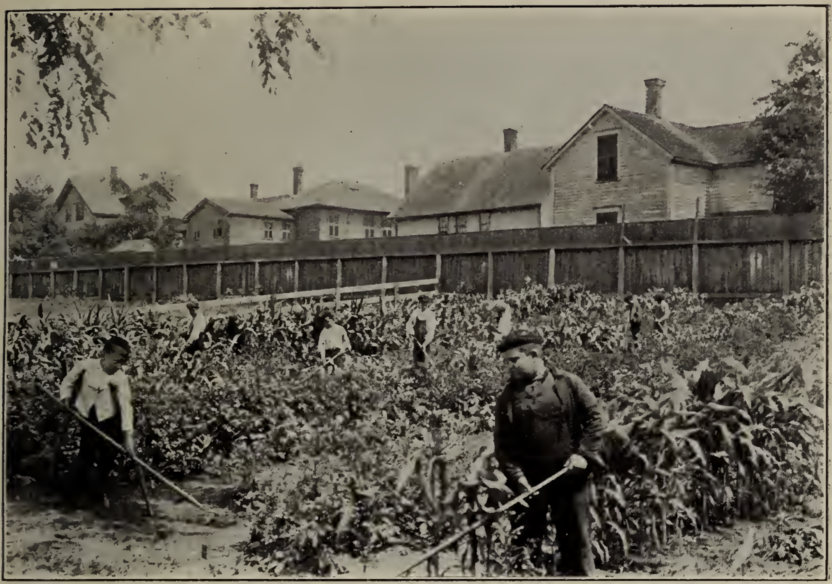

FIG. 1.—Results were better than had been expected. Pawtucket Boys' Club.

NOTE.—This picture and those from the Portuguese Mission, Providence, indicate what children, many of whom have begun life under more or less adverse circumstances, can accomplish in garden work. Of far more importance, however, are results which cannot be pictured, but which are nevertheless real and tangible, namely: better character building and consequently better citizenship.

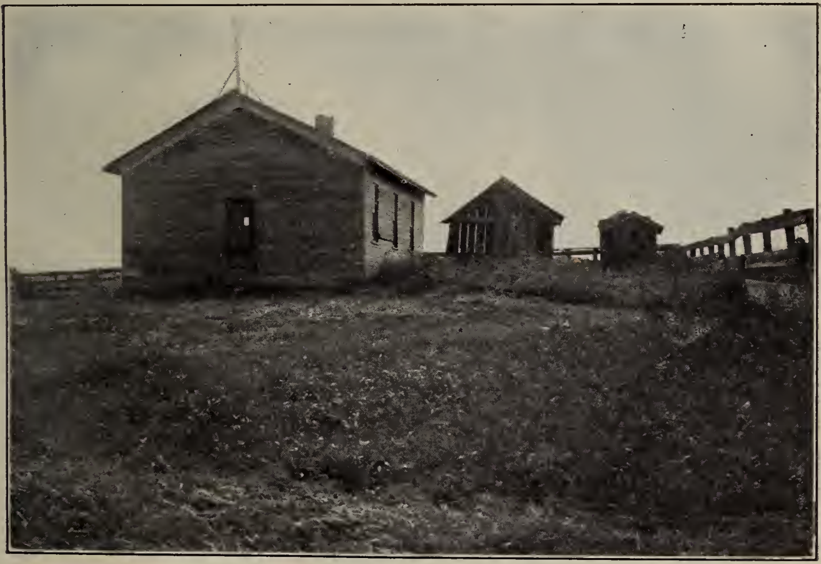

FIG. 2.—Type of country school which must be remodeled and revitalized through a new rural education. The highest class of schools are essential to the best agriculture and to the best rural citizenship, and these are the fundamentals on which the welfare of the nation must be based.

of fully as much value to a student in later life to be able to tell how to grow corn and potatoes, as it is to be able to name the highest mountains or the longest river of some far-off country.

Furthermore, school gardening adds to our public school curriculum something that it has lacked, in a great part at least, in the past; namely, a method of training which shall develop the mind through the activities of the body, and which shall instill into the pupils habits of thrift and industry, and a respect for physical labor. The proper combination of physical and mental effort is recognized as being the true method of child training. In the past the education of children has been too much on the mental side and largely of an indefinite kind. Children's gardening offers an opportunity to introduce labor of value to the physical development of the child, and it also, by correlation with subjects formerly taught, gives to them added life and interest.

It is recognized that in order to keep pace with the development in children's garden work and the future demand for the teaching of elementary agriculture, it is essential to train more workers. In our schools, for instance, the movement can obtain but little growth unless we have teachers who can direct the efforts of the pupils, and, with commendable foresight, Principal Alger of the State Normal School, has established a course in school gardening for prospective teachers who may come to that institution for training. This should lead eventually to the establishment of courses in elementary agriculture at the Normal School, or what would be more effective, in many ways, perhaps, to the requirement—at least for rural teachers—that they should take supplementary courses in agriculture at an agricultural college before they would be considered fully equipped for their profession.

In order to anticipate the needs of teachers who are actively engaged in their life work, and who may wish to keep abreast of the times in regard to agricultural education, the Rhode Island State College has established a summer school in which, in addition to other subjects, a prominent place is given to courses in elementary agriculture and school gardening. The College is ideally located for a summer vacation school and is, of course, especially equipped for imparting agricultural instruction in the widest sense of the term.

As a further help in this work, the Extension Department of The College is publishing monthly, during eight months of the school year, a little nature study leaflet, the purpose of which is to disseminate, for the use of teachers and pupils, information in regard to nature study and elementary agriculture.

## Acknowledgments.

In an account of this nature intended as a report to the State College, and to the Board of Agriculture, of the school garden work accomplished with the funds provided by these organizations, it is impossible to give due credit to all the different agencies which have lent more or less support to the efforts which have been put forth. The writer feels, however, that he would not be doing his full duty if he did not register in this, the first report of the work, due acknowledgment to some of the more active individuals and organizations who have given important aid in securing the results achieved.

As already stated, the Extension Department of the College took up children's gardens as a part of its program immediately after its organization, and in spite of the fact that financial support, even to the extent of providing proper tools, could not be secured, nevertheless the writer felt then, almost as fully as he does now, that the work was decidedly worth while. Valuable lessons in the methods of garden work and in the requirements for success, as, for instance, the fact that the best results cannot be accomplished without proper tools and reasonable facilities in regard to land suitably fertilized and prepared, were also thoroughly emphasized and stored away for future use.

School gardening as well as other forms of extension work was new, however, and it is doubtful if immediate headway in securing funds could have been made by the Extension Department had it not been for the inspiration given by the League of Improvement Societies and its officers, but especially by Mrs. Mary E. S. Root, Chairman of its garden committee. To her a large share of credit is due for promoting the campaign which resulted in the appointing of a school garden instructor in the Extension Department of the College, and for her continued help and enthusiasm in developing the work.

In any work which has to be so largely with the Schools or children of school age, very much of its success depends upon the attitude of those in charge of the school systems. In Rhode Island, the School Garden movement has had the approval and cordial support of Hon. Walter E. Ranger, State Commissioner of Schools, and we acknowledge a great many helpful suggestions from him in connection with the development of the work.

To President Edwards of the College acknowledgment is due for his constant encouragement and support of the work so far as the funds of the institution would permit and to the Board of Agriculture, and especially its secretary Mr. John J. Dunn, and the members of its executive committee, for their unselfish co-operation and financial support.

The work would not have reached its present success had it not been for the cordial support of the late Mr. Small, former superintendent of the Providence schools, and more especially of the present superintendent, Mr. Condon, through whose energetic activity in the short time that he has held office, the city of Providence has been placed in the forefront of cities giving support to school gardens.

Credit is also due to the principals and teachers of many of the Providence schools, especially Principals Winslow and Frazee, who have encouraged the work in connection with their schools and who have worked constantly for its enlargement and for its official recognition by the school authorities.

The writer feels that this part of the report would be very incomplete without a word of recognition of the work of Mr. Thomas, to whose courteousness, tact, untiring energy, and faithful application, the success of the work has been very largely due. Extended commendation will not be necessary for his report of the work which follows, will speak for itself.

Many others, both in Providence, where most of the work has been conducted, and in other parts of the State have lent valuable aid, but space forbids entering into further detail here and credit will be given so far as possible, in subsequent pages of this report.

# TO THE TEACHERS.

BY ERNEST K. THOMAS.

The school garden is attracting a good deal of attention in elementary education at the present time. This fact was brought out in a striking manner at the meeting of the National Educational Association held in Boston the week of July 4, 1910.

A special school garden luncheon was prepared in honor of assistant secretary of agriculture, W. M. Hays. Vegetables, fruit, and flowers were sent in from nearly every state in the union, and from Canada. About three hundred prominent educators from all parts of the country were present.

Teachers in elementary schools cannot realize what a valuable asset a garden is in connection with their schools until they have tried it.

A few of the many ways in which garden work may be correlated with the other school studies are presented in the following letter from a city teacher, after one year's experience:

"The diaries provide excellent language material. Much more interest is manifested in writing a series, when the parts are the names of plants in the gardens. Two children's experiences are not alike in their garden work, so there is variety and originality in their accounts. Their enthusiasm in the work gives added interest to the letters which they write in school, because they are glad to have a chance to tell someone that their beans are seven inches tall, or that the pigeons did not eat their peas, or that their radishes are almost ready to eat.

"The day after the work in the garden, the spelling lesson consists of words needed in writing accounts in the diaries. The children try very hard to get the syllables correct so they can divide the words correctly in their diaries.

"Finding the area of a surface was easily taught this year because the children wanted to find out how large their little farms were. They knew that each garden was 7 x 9 feet, and it was easy to teach them to multiply to find the number of square feet. Problems had new meaning and were easily understood when based on garden experiences. At 3 cents each, how much did 275 cabbages cost? If there are four tomatoes in a row, how many in the whole school garden? These are samples of original problems given. The radishes, tomatoes, and other plants were very successfully utilized for drawing lessons.

"A parent who has had some trouble in inducing her boy to go to school regularly says that she has heard no objections to going to school since the school garden started."

When most of the studies in the curriculum are made of such vital personal interest to the pupils through correlation with their garden work, better results will naturally follow. Prominent teachers of arithmetic state that much of the backwardness of pupils, especially in arithmetic, is due to the fact that they are not familiar with the content of the problem. If the arithmetic and other studies are correlated with the garden work, the pupils have a peculiar interest in the problems because of their personal interest in the school garden. They understand the principles involved from the plowing and fertilizing of the soil to the staking out of the individual plots and paths, the planting of the seed, the growth and care of the plants, and the harvesting of the crops.

There is always something to interest the pupils in the school garden. First comes the soil. What it is, and how it was formed. The wonderful agencies which have been and are still active in its formation. Why soils differ in character and composition. They learn to know the different kinds of seeds and why they are planted at different depths; and how the various crops, which they are familiar with on the table or in the market, are produced in the field.

The garden work appeals to the child directly. In fact, it is a natural instinct of childhood, a racial, primitive instinct. When our forefathers learned to till the soil and plant it, they learned to live together and make homes, because they must wait for the crops to mature. So that the cultivation of the soil is as old as human society. Civilization is dependant upon agriculture. It has always been intimately connected with the development of the human race. We depend upon it for the food supply of the whole world, and for the raw material which is largely responsible for prosperous business conditions. If a certain crop fails through an unfavorable season, then all the industries dependent upon that crop become depressed.

If agriculture should cease, what would happen to humanity? It would deteriorate and probably revert to barbarism.

Efforts should be made in all our schools to teach the scientific principles which underlie an industry that means so much to humanity and the future prosperity of the country.

School gardening, then, means much more than the planting of a few vegetables and flowers for decorative effect or economic assistance. It should be the study of the principles of agriculture, an industry which is the primary basis of all wealth. This will necessarily include the study of natural phenomena, or nature study. Educators generally agree that a knowledge of natural phenomena is one of the fundamental principles of education.

In the school garden we have one of the best laboratories that can be maintained, both for the high and the elementary schools, and at a very slight expense.

Gardening also provides physical exercise in the open air and sunshine, and keeps the boys usefully employed when they might be wasting their time in undesirable places. It arouses interest in real things, and brings the child into close contact with mother earth.

Many civic virtues may be taught in the school garden: private care of public property, self-reliance, the dignity of labor, and respect for the men who work with their hands.

Instruction in gardening must exercise a refining influence upon the youthful mind, and direct the taste through a love of nature toward many beneficial studies.

Children forced to live in insanitary tenements, crowded alleys, and evil surroundings, cannot help becoming vicious, unless something is brought into their lives to counteract such influences.

"The man who loves his garden can hardly be anything but a worthy citizen, broadened as his mind must be by close investigation of the mysteries and miracles of nature in the seed, the bud, the blossom, and the fruit. Certainly nothing helps more to make life interesting and wholesome than an understanding of the marvels that surround us in nature. And in these days, when the tendency is to drift townwards and accentuate what is one of the most difficult social problems, we ought to do what we can to encourage young people not to regard country life as dull, but to try to find the interests in it, which are there if they will only look."

In rural districts the work should be presented in a somewhat different form. To the city child, planting the seeds and the development of the plants are a revelation, but the children in the rural districts are usually familiar with the simple garden operations. To stimulate and sustain their interest, simple experiments should be undertaken, such as the effect of different fertilizers upon plant growth; growing several varieties of a certain crop to determine the most suitable variety for local conditions; a little more advanced study of the soils and fertilizers; insects, their relation to plants; propagation of plants; raising trees and shrubs from seeds and cuttings; beautifying the home and school grounds, etc. By teaching the principles of cause and effect, children will usually respond whether in the country or in the city.

It has been stated that the object and final end of the school garden is the development of home gardens. Pupils should be encouraged to apply at home the knowledge obtained in the school garden, on a larger scale, if possible; but the school garden has a higher object, and the final end should be the development of a more intelligent citizen, broadened in mind by an understanding of natural phenomena, and strengthened in body by physical exercise in the open air and sunshine.

### Size of the Garden.

Care should be taken not to make the garden too big. Remember that the school garden is primarily an educational movement, and that many ethical and civic lessons should be taught in connection with the work.

If the garden is too big, the amount of work to be done will discourage the pupils. If the necessary work is not done, the garden soon becomes untidy, and the educational value is at a minimum.

The school garden should be of such size that will enable the pupils to do the necessary manual work without becoming physically tired. It will be impossible to teach any lesson that requires mental activity, if the pupils are tired from working in their gardens.

The economic side of the school garden work is an important one. It is probably the only value which the pupils, and in some cases the parents, can see. Teachers should always get down to the child's point of view. Children can hardly wait for the crops to mature. They want to take something home to show their parents and friends the results of their work. Parents will always welcome fresh vegetables and flowers. Now, in a very poor neighborhood, where there are no home gardens, nor even yards where they could be made, it may be best to make the gardens as large as possible, so that the vegetables raised will reduce household expenses considerably. On the other hand, if the children come from good homes in which the vegetables raised in the school garden would not affect the daily menu, it may be best to have smaller gardens and emphasize the educational side already referred to. Then again, there is another question which might be raised. In a poor district, which is better, to take in a few pupils and give them large plots, so that the products will be of appreciable value in the home, or, to bring in from the streets and gutters as many children as possible, so that they may receive instruction in the principles of plant and animal life, and the

PLATE IV.

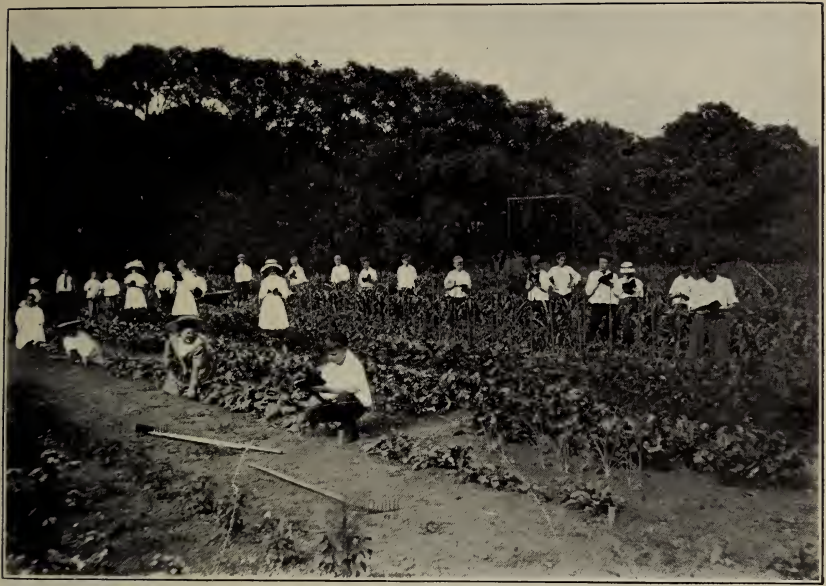

Fig. 1.—Taking notes at the end of a lesson. School Garden, Roger Williams Park, Providence, R. I.

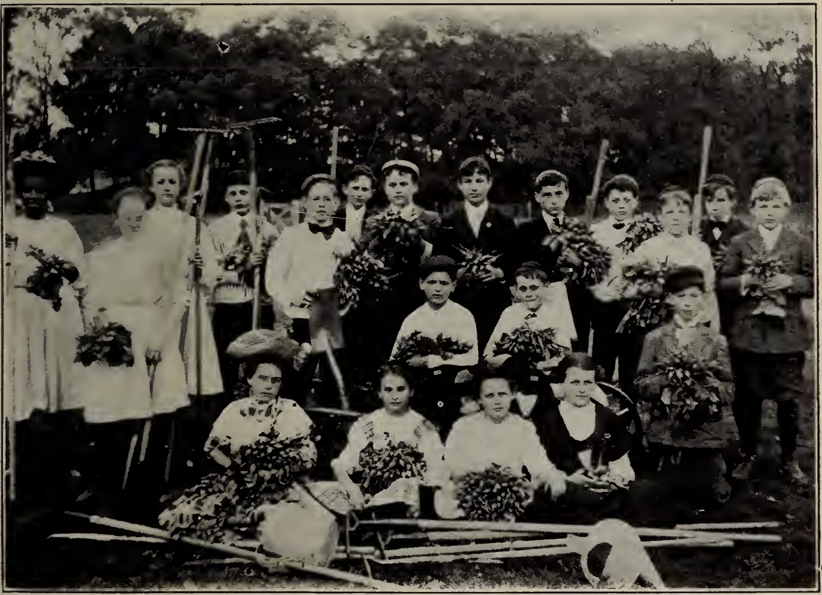

Fig. 2.—The first crop. School Garden, Roger Williams Park, Providence, R. I.

relation of the one to the other; together with some necessary civic virtues, in an environment which will exert a powerful influence in the moulding of their characters.

The writer would favor the latter method, even if each child has only a square foot and one plant to care for. The question is a local one and should be decided by those familiar with the local conditions.

## LESSONS WHICH MAY BE TAUGHT IN CONNECTION WITH THE SCHOOL GARDEN WORK.

### Soil.

Soil as the source of all life and wealth.

Origin, formation, kinds, composition, enriching the soil, tillage, simple experiments.

References: "The Soil," by King; "Principles of Agriculture," by Bailey; "Talks about the Soil" by Barnard; Farmers' Bulletins 20, 77, 245, 257, 406, 266, 421, 44, 192, copies of which may be obtained from the Secretary of Agriculture, Washington, D. C.; and Nature Guard Leaflets, Extension Department, R. I. State College, Kingston, R. I.

### Plants.

As food for man and animals. Industries and prosperous business conditions dependent upon successful crops. Parts of plants and the work of each part: root, stem, leaf, flower, and seed. How plants purify the air. How plants live. How plants take up their food from the soil.

Propagation. Requisites for germination. Simple experiments.

References: "Experiments with Plants," by Osterhout; "Lessons with Plants," by Bailey; "Talks about Plants," by Barnard; Farmers' Bulletins 28, 134, 157, 185, 86, 95, 218, 248, 195, 385, 408, 228, 173, 327, 358, 423; Nature Guard Leaflets, Extension Dept., R. I., State College.

## Animals.

Dependent upon plants and, consequently, upon the soil for food.

Source of human food.

Useful animals and insects; injurious animals and insects. Birds.

References: "Our Insect Friends and Enemies," by Smith; "Birds and their Relation to Man," by Weed and Dearborn; Natural History Readers; Nature Guard Leaflets; and Farmers' Bulletins 22, 49, 51, 55, 64, 137, 141, 170, 177, 200, 234, 328, 330, 54, 196, 335, 383, 369, 287, 413, 99, 155, 264, 275, 132, 59, 165, 397.

## Weather.

The sun as a source of energy. The dependence of life upon solar heat. Seasons, atmosphere, climate.

References: "Talks about the Weather," by Barnard. "The Weather Bureau and the Public Schools," by Weeks, U. S. Dept. of Agriculture, Yearbook, 1907.

## Hygiene.

Emphasize the importance of cleanliness and neatness in all garden work. Teach the importance of abundance of fresh air to plants and man by covering one plant with a glass jar so as to shut out all the air, and another with a large lamp chimney, so as to allow some air to enter. The former will show signs of suffering first, and the latter shortly afterwards.

Illustrate the importance of sunlight by excluding the light from a few plants by covering them with boxes. The experiment may be arranged so as to allow different amounts of sunlight to reach the plants, by covering the bottom of the box with linen, or some other material to shut out a small portion of the sun's rays; another box with two or three layers of the same material; and a third, so as to exclude all light.

Leave the boxes on for about a week, and then examine the plants.

They will be found sickly and pale looking; and if covered up very much longer, they will be killed.

Sunlight is the best germicide, and doctors tell us the germs of most diseases will be killed if the sun's rays can get at them for only a few seconds.

Numerous insects and worms will be found under the boxes. Point out the fact at this time that many household insects thrive in the dark.

Teach the children to apply all these lessons to themselves and in their homes, and to observe the different color in the faces of the people they meet on the street. It will be an easy task to tell whether a person works in a mine, a factory, or out in the open air and sunshine.

When thinning out seedlings, leave a row to show how weak and useless the plants will be when allowed to overcrowd. The evils of crowded, unsanitary tenements can be well brought out by referring to the plants.

### Economy in Time and Personal Strength.

There is a right and a wrong way of doing everything. In the school garden, every movement should be well thought out ahead by the teacher, and the pupils should be taught how to perform every garden operation with the least expenditure of time and personal strength. The garden work offers unusual opportunities for teaching the pupils to think logically, and when they realize that there is one way of doing simple garden tasks, such as, spading, hoeing, weeding, etc., which is much easier and better than some other way, they will never forget the lesson, and will apply the same reasoning to other tasks all through life. This will result not only in a saving of their own time and strength, but of those over whom they may have control.

It is much easier to force a spade into the ground at an angle and if the corner is started first, than it is to force the whole spade down straight. It is easier to lift a spadeful of earth if the left hand grasps the handle nearer the blade than the middle of the handle—an application of the principles of the lever.

Spading is much easier if the back is kept straight as much as possible, leaning over only to lift the spade. Use the weight of the body rather than the muscles to force the spade in the soil.

Weeding is not nearly so tiring if the pupils squat down beside their gardens, keeping the back fairly straight, as it is if the legs are kept straight and the body bent over.

The wheelbarrow will run easier if the wheels are greased. In loading the wheelbarrow, the weight will pull less on the arms and shoulders if it is placed so that it slopes over the wheel rather than towards the handles.

A wheelbarrow with movable sides may be emptied easier and is handier in many ways than one with fixed sides.

A pail of water in each hand can be carried much easier than one pail in one hand.

When hand weeding, save time by placing the weeds in a basket, not on the walk. They will have to be picked up from the walks.

In hoeing or raking, do not allow the pupils to throw the blade of the hoe or the teeth of the rake as far away from them as possible. They should stand well up to their work, with the hands well apart on the handle.

## Correlation of Garden Work with Other Subjects.

The garden work is most valuable when correlated with the other subjects in the curriculum, such as the arithmetic, language, geography, drawing, etc.

For an excellent plan showing the relation between garden work and the other subjects in the primary school, grade II, see page 295 of "Among School Gardens," by Dr. M. L. Greene.

## Books on Children's Gardens.

"Among School Gardens," by M. Louise Greene, M. Pd. Ph. D. —Charities Publication Committee, 105 East 22nd St., N. Y.

"Children's Gardens for Pleasure, Health, and Education," by Henry G. Parsons.—Sturgis & Walton Co., New York.

"Practical School Gardening," by Elford and Heaton.—The Claredon Press, Oxford.

"The School Garden Book," by Weed and Emerson.—Charles Scribner's Sons, New York.

"How to Make School Gardens," by H. D. Hemenway.—Author, Hartford, Conn.

"Hints and Helps to Young Gardeners," by Hemenway.—Published by the Author, at Hartford, Conn.

"Little Gardens for Boys and Girls," by Myrta Margaret Higgins. —Houghton, Mifflin Co., New York

"The Practical Garden Book," by Hunn and Bailey.—Macmillan Co., New York.

"Children's Gardens," by Louise Klein Miller.—Appleton Co., New York.

"School Gardening and Nature Study in English Rural Schools, and in London."—Office of Exp. Sta., U. S. Dept. Agr., Washington, D. C.

### Farmers' Bulletins.

No. 218. The School Garden.
195. Annual Flowering Plants.
185. Beautifying the Home Grounds.
157. The Propagation of Plants.
28. Weeds and How to Kill Them.
127. Important Insecticides: Directions for Their Preparation and Use.
146. Insecticides and Fungicides.
192. Barnyard Manures.
77. Liming Soils.
255. The Home Vegetable Garden.
257. Soil Fertility.
266. Management of Soils to Conserve Moisture.
406. Soil Conservation.

Farmers' Bulletins will be sent free to any address in the United States on application to a senator, representative, or delegate in congress, or to the Secretary of Agriculture, Washington, D. C.

The Nature Guard leaflets take up seasonable topics, and may be obtained free of charge from the Extension Department, Rhode Island State College, Kingston, R. I.

Teachers should consult other books on Nature Study and Agriculture and present the lessons to suit the grades which they teach.

Information regarding school gardens and nature study may be obtained from the Extension Department of the Rhode Island State College, Kingston, R. I.

# SCHOOL AND HOME GARDENS IN RHODE ISLAND.

BY ERNEST K. THOMAS.

### Season of 1908, 1909, 1910.

## PROVIDENCE, 1908.

At a meeting of the League of Improvement Societies in Rhode Island, held early in the spring of 1908, a committee was appointed to see what might be done toward inaugurating a course of instruction in school gardens, for the benefit of pupils in the grammar grades. The pupils in the primary grades had been receiving instruction along these lines for many years under the direction of Miss Sarah Dyer Barnes, and the second assistant superintendent, Miss Ella L. Sweeney.

The committee consisted of Mrs. M. E. S. Root (chairman), Dr. Helen C. Putnam, Miss Elizabeth Holbrook, Prof. A. E. Stene, J. E. C. Farnham, Asa G. Randall and Victor Frazee.

This committee asked the Rhode Island State College for assistance and the college agreed to furnish an instructor from its extension department. At the instance of the college the State Board of Agriculture voted a sum of money towards paying the expenses of the instructor and other incidentals. The committee also petitioned the park commissioners for land, and were granted a large plot on the "Island" in Roger Williams Park.

### Roger Williams' Park Garden.

Street sweepings were donated by the department of public works of the city. The land was then plowed and dressings of lime and fertilizer were evenly distributed and harrowed in, leaving the surface well pulverized. A wire netting fence was put up around the plot to keep out the sheep.

The plot of ground was laid out by the pupils and contained seventy-two individual gardens, each 10 x 20 feet; a neat stake was placed at each corner, with the number of the garden stamped on one of them. The gardens were divided by paths, two feet wide running east and west, and three feet wide running north and south. The center paths in both directions were made 6 feet wide to facilitate the removal of debris, and to accommodate groups of visitors inspecting the gardens. Pupils from the neighboring grammar schools, Broad St., Peace St., Lexington Ave., Vineyard St., and Oxford St., attended this garden twice a week from May to October. The attendance was good all through the season. To obtain a garden the pupils were required to sign the following application blank, which also requires the signature of the parent or guardian.

## Application Blank for School Garden Plot................

I hereby apply for a School Garden Plot in

..............................................................

If granted, I faithfully promise to comply with the following regulations:

1. To attend regular and punctually, and if absent or late, furnish excuse from teacher or parent.
2. To obey the instructor and perform the work assigned by him in connection with the garden work.
3. To clean tools and hang them up in their proper place after work.

PLATE V.

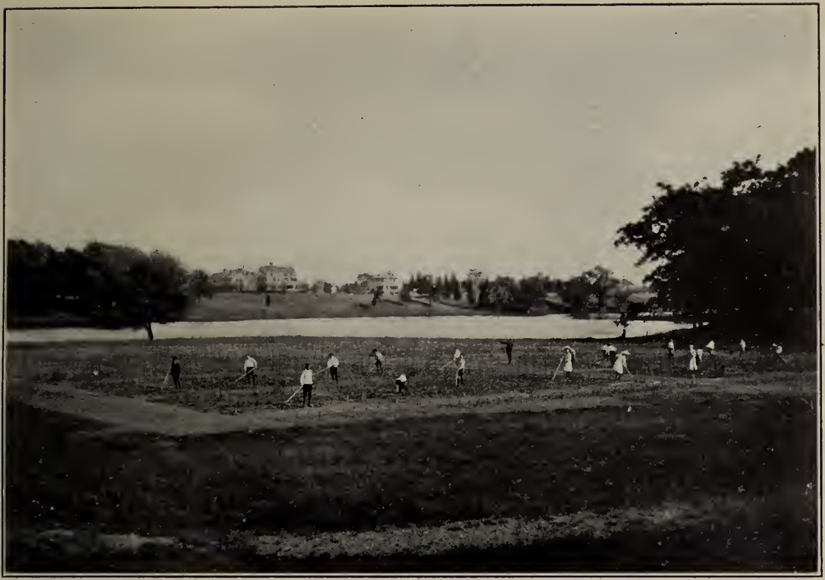

Fig. 1.—Roger Williams Park, School Garden, Providence, R. I. Beginning work in spring.

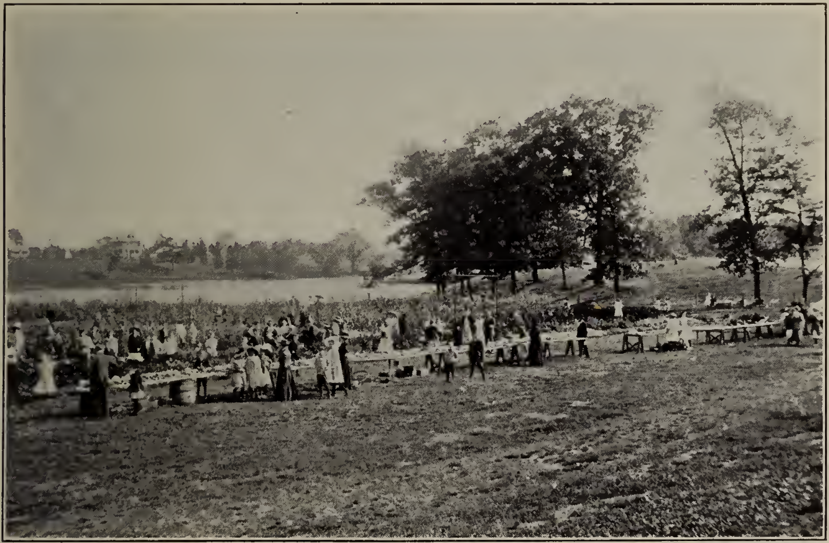

Fig. 2.—Roger Williams Park, School Garden, Providence, R. I. The work ends with an exhibition of products in the Fall.

4. Not to remove any produce from the garden without first notifying the instructor.

Pupils who do not comply with the above regulations are liable to lose the privilege of having a garden.

Pupils are required to purchase a hoe and rake, which will be furnished at wholesale price (about 50 cents for both), also seeds at 1 cent a package.

| | |
|---|---|
| Name of Applicant: | Name of Parent or Guardian: |
| ........................... | ........................... |
| Address:...................... | Address: ...................... |

Name of School which Applicant Attends:........................

Date of Application:..................................

The following planting scheme was drawn up and a copy was given to each pupil. It contains a list of plants grown in the individual gardens, also instructions as to depth to plant, distance apart, etc.

## Planting Scheme for School Garden.

| | Crop. | Depth to plant. | Average time of growth. | Distance apart in rows. | Remarks. |
|---|---|---|---|---|---|
| | Corn | 2″ to 2½″ | 12 weeks | Plant 4″ apart thin to 8″ | |
| 1 | 1¼ ft. | | | | |
| 2 | Lettuce | ½″ | 6–8 weeks | Hills 6″ apart | |
| | 1¼ ft. | | | | |
| 3 | Corn, Early | 2″ to 2½″ | 10 weeks | Same as above | |
| 4 | 1¼ ft. | | | | |
| | Lettuce | ½″ | 6 to 8 weeks | Same as above | |
| 5 | 1¼ ft. | | | | |
| | Tomatoes | Plants | 16 weeks | Plants 2″ apart | |
| 6 | 1¼ ft. | | | | |
| | Radish | ¾″ to 1″ | 4 weeks | In drills | |
| 7 | 1¼ ft. | | | | |
| 8 | Tomatoes | Plants | 16 weeks | Plants 2″ apart | |
| | 1¼ ft. | | | | |
| 9 | Peas | 2″ | 9 weeks | 2″ to 3″ apart | |
| | 1¼ ft. | | | | |
| 10 | Cabbage | Plants | 18 weeks | Plants 2 ft. apart | |
| 11 | 1¼ ft. | | | | |
| | Peas | 2″ | 9 weeks | 2″ to 3″ apart | |
| 12 | 1¼ ft. | | | | |
| | Potatoes | 3″ | 15 weeks | Sets 6″ | |
| 13 | 1 ft. | | | | |
| | Radish | ¾″ to 1″ | 4 weeks | In drills | |
| 14 | 1 ft. | | | | |
| 15 | Beans | 2″ | 9–10 weeks | 6″ to 8″ apart | |
| | 1½ ft. | | | | |
| 16 | Beans | 2″ | 9–10 weeks | 6″ to 8″ apart | |
| 17 | 1½ ft. | | | | |
| | Carrots | ½″ to 1″ | 16 to 20 weeks | In drills | |
| 18 | ¾ ft. | | | | |
| 19 | Radish | ¾″ to 1″ | 4 weeks | In drills | |
| | 1 ft. | | | | |
| 20 | Beets | 1 in. | 9 weeks | In drills | |

### The Flower Garden.

A border three feet wide on three sides was given up to annual flowers. The following varieties were planted and cared for by the pupils: portulacca, petunia, sweet alyssum, asters, balsam, calendula, coreopsis, candytuft, celosia, dianthus, centaurea, eschscholtzia, mignonette, marigolds, nasturtiums, sweet peas, verbena, zinnia, helianthus, cosmos, phlox, castor bean, four o'clocks, etc.

### The Botanical Garden.

This consisted of a border four feet wide on the south side of the garden, in which plants were grouped according to their natural order of family, see page 97.

### The Exhibition.

An exhibition was held on Saturday, September 19th, 1908, near the school garden. The children took from their gardens samples of the crops matured at that season. Their exhibits consisted of potatoes, beans, tomatoes, beets, corn, turnips, carrots, radish, lettuce, cabbage and spinach. Prizes were awarded for the four best individual gardens and for the best exhibits. Those that had flower gardens were allowed to enter a vase of flowers in competition for artistic arrangement.

Miss Isabel Holbrook, State Normal School, Mr. C. W. Smith, Secretary Horticultural Society and Mr. Sidney Sherman, English High School, kindly officiated as judges at the exhibition, and Mr. I. O. Winslow, First Assistant Superintendent of Schools, Mr. William Williams, State Board of Agriculture, and Prof. A. E. Stene, R. I. State College, judged the gardens.

The exhibition attracted a good deal of attention and was attended by several hundred people. The Mayor, Hon. P. J. McCarthy, who gave the pupils the prizes, awarded by the judges, praised the school garden movement, and said that he would like to see it a part of the State school system.

So keen was the rivalry among the children that the garden work was productive of unusually good results; the crops were large and of excellent character.

The children kept diaries all through the season, writing down what they were told about the soil, its cultivation and fertilization; the planting of the different seeds, and care of the resulting plants, the history description, and remedies for the injurious insects which attacked their plants, and an account of everything they did in their gardens.

The following is a sample of the notes kept by the pupils: Notes copied were made by Ethel Farley, Grade VII, Broad Street School, Providence.

### *Cabbage Worm.*

"The cabbage worm was imported into this country from Europe about the year 1857, since then it has become exceedingly destructive over a large portion of the United States and Canada.

### *The Adult.*

"The adult is a common white butterfly, the female of which has two black spots upon each of the front wings while the male has but one.

"The female deposits small yellowish eggs upon the cabbage leaves, which soon hatch into little larvae that feed upon the foliage. In about two weeks they become full grown when they find some shelter, as beneath the lower leaves, where they change into chrysalids.

"They remain in this condition about ten days when they emerge as butterflies to lay eggs for another brood of worms. The winter is passed in the chrysalis state.

"The larvae are often destroyed by thousands, by a bacterial disease—a kind of insect cholera—that has lately aided in checking this injurious pest.

### *Remedies.*

Pyrethrum—Insect powder or buhach."

In addition to the garden work the pupils collected caterpillars and insects of all kinds found in their gardens at home, or along the roadside, and brought them to the school garden, where they were studied with much interest.

The children were particularly interested over what was termed the "Bug House." It consisted of a wooden frame covered with screening, into which any caterpillars brought to the school garden were put and their development carefully watched; the transformation from the larva to the pupa, and from the pupa to the imago interested the pupils very much. Methods of preserving and mounting insects also received attention.

The extension department of the R. I. State College provided a number of insects placed in Riker mounts, showing a few of the more common species from the more important orders of insects. Many insects brought to the garden were identified by comparing them with the mounted specimens.

The different species of trees and shrubs growing in Roger Williams Park were pointed out to the pupils, also the wild flowers. Many species and varieties flourished around the swamp. Here the difference in the character of the vegetation was noted, the floating aquatic forms, the subaquatic species of the wet shore, and the wood or meadow vegetation of ordinary soil.

The location of this garden was a valuable one for bird study. Many species were noted during the year.

In order to ascertain the opinion of the parents on the matter, they were asked to answer the following questions.

"Parents will greatly assist the school garden committee of the League of Improvement Societies in making plans for next year by fully answering the following questions:

1. Are you pleased with the results of your child's work in the school garden?
2. Would you be glad to have a similar arrangement next year?
3. Have you noticed any objectionable features in the plan? If so, please state them.
4. What change or improvement would you suggest for next year?
5. At about how much do you estimate the total expense for your child, including car fares?
6. About what is the money value of the product taken from the plot?
7. Has the garden experience aroused your child's interest or

ambition in any special line of work or study, such as gardening, farming, nature study, study of trees or insects, etc.?

8. Apart from (5) and (6), in what ways do you think the garden work has been good for your child?

9. Would you be in favor of regular, organized garden work and instruction for children in connection with the public school system?

10. As a result of the school garden work, will you probably arrange for your child to have a garden plot at home next year? If not, why?

11. Further remarks.

(Sign)

Parent."

The replies to these questions were very encouraging. There were no adverse criticisms. Every one was pleased with the results of the work.

Many replied in answer to No. 7, that their children appeared much brighter and more careful with little things around their homes; and that their boy was much interested in bugs, or in growing potatoes or corn. In one case a parent wrote that her daughter's health had been very much improved. As a result of the work at the park, she expressed a desire to have a garden at home. Formerly she had no desire for anything, but sitting indoors reading childish books. The physical exercise in the open air and sunshine, helped her in many ways.

The parents are unanimous in the opinion that the movement is one from which children derive much benefit, apart from the value of the products raised in the school garden.

In answer to No. 9, there were no objections raised to a well organized system of instruction in gardening in connection with the public school system; on the contrary nearly every one favored the idea and many were quite enthusiastic. The average value of the products raised in the individual gardens which were 10 x 20 feet was $5.00.

### Manton Avenue School Garden.

The following report of the principal, Mr. Victor Frazee, is presented here, as it appeared in the report of the Providence School Committee, for 1907–08.

"The garden at the Manton Avenue School was, in common with the gardens at Roger Williams Park, the outcome of the initiative of the League of Improvement Societies in securing the appointment by the Rhode Island State College, of an instructor in gardening, who should, for this year, be made available for work in connection with the grammar schools of Providence.

Through the generosity of Mr. Herbert C. Calef, Mr. Patrick F. Donnelly and Mrs. William Small, the school was so fortunate as to secure the use of seven house lots, amounting to more than half an acre of land, adjoining the school yard.

This land had formerly been cultivated, but for many years had been in sod. It was plowed April 11th; then thoroughly harrowed. During the following week three cords of street sweepings were hauled from the city yards and harrowed in. April 25th, nine hundred pounds of agricultural lime and five hundred pounds of commercial fertilizer were applied.

Arrangements had been made by which this garden was provided with commercial fertilizer, lime, implements and seeds jointly with the park gardens; the implements to be supplied at cost to those children who needed them; the seeds, in penny packages, to be given out as required.

The project was now explained to the children and they were asked to consult their parents and decide whether they would join the classes or not. Sixty children responded favorably and were formed into four classes. The details are indicated in the following schedule:

| Classes. | Rooms. | Grades. | Boys. | Girls. | Total. | Size of Plots. |
|---|---|---|---|---|---|---|
| I | 1 | 8 and 7 | 5 | 7 | 12 | 10 x 30 ft. |
| II | 5 | 7 and 6 | 9 | 7 | 16 | 10 x 20 ft. |
| III | 6 | 5 | 8 | 6 | 14 | 10 x 15 ft. |
| IV | 2 and 3 | 4 and 3 | 13 | 5 | 18 | 10 x 6 ft. |

During the week of April 27th a group of older boys, under direction of the principal, carefully measured the land and staked it out into plots. About 250 stakes had been previously made from saplings cut from the woods and sharpened by volunteer workers among the boys. The stakes were used to mark the corners of the plots. Paths from two to six feet wide were left between the plots and sections. This preliminary work was done out of school hours.

The instructor, Mr. Ernest K. Thomas, arranged to devote Monday and Thursday forenoon to this garden. On Mondays classes I and II received a lesson; on Thursdays classes III and IV. The first class reported at 8:30 and continued work 'till 10. The second class took from 10:30 'till 12, working on during recess. The third and fourth classes, owing to the smaller size of their plots, took shorter periods. This weekly lesson for each class took the place of nature study in the program.

The first lessons were given May 4th and 7th. After listening to a brief talk by the instructor, on the first steps in preparing a garden, each pupil raked the stones and clods from his plot and loosened and smoothed the soil. Each plot was defined by a string passed around the stakes. Much of this work was completed before and after school, some pupils, in their zeal to profit by instructions, devoting many hours to getting the soil thoroughly worked over and in the finest possible condition for planting.

The rakings from the plots soon accumulated in great quantities in the paths. Pupils brought wagons and wheel-barrows and removed these piles to the side of the garden, whence they were afterwards carted away. This part of the work, which had to be done after hours and was downright drudgery, afforded an opportunity for the display of a fine public spirit. Pupils who owned the necessary vehicles and implements, after clearing the paths about their own plots, generously loaned their property to others. In many cases they gave in addition their own labor, not only in aid of their friends, but often for the improvement of the garden as a whole.

On May 8th the pupils of classes I and II brought the necessary

PLATE VI.—Exhibition Day, School Garden, Roger Williams Park, Providence, R. I.

pennies and were provided with packages of peas, lettuce, and radish seeds. Most of the implements were brought from home, but a few hoes and rakes were brought from the supplies of the park garden.

May 11th and 14th the first planting was done. At the beginning of the lesson the class gathered about one plot to receive instructions. They were told something about the seeds to be planted, shown how to make the drills, place the seeds and cover them. The garden line was then stretched continuously across all the class plots. Each child went to his own plot, made a drill beside the line and planted and covered the seeds as directed. Markers were placed at the ends of the rows. The line was then shifted and another row similarly planted and marked.

At subsequent lessons corn, beans, beets, carrots and turnips were sown. The larger plots permitted the planting of two or more rows of several kinds of seeds. After the first few lessons some latitude was allowed. Some children in each class purchased tomato plants at the stores and set them. Some planted potatoes. Others were content to plant more radishes or beans or lettuce in the corresponding rows. Members of the first class were allowed to plant one-third of the length of their plots to suit their individual tastes. Some chose cucumbers and squashes; others put in more rows of the commoner vegetables. By the end of May practically all the plots were fully planted.

At the farther end of the garden a section about 50 x 100 feet remained unappropriated. This was marked off into what were called the school plots, which were planted to beets, carrots and corn, and cared for co-operatively as opportunity arose. It was agreed that the products of these plots were to be sold and the proceeds applied towards the payment of expenses.

Towards the close of the term, in June, it was announced that the parents would be invited to inspect the garden on the last day of school, when, also, the plots would be judged and scored for the first time. Under the stimulus of this announcement many extra hours of work were done. Plants were thinned out, plots cultivated and smoothed, edges trimmed, weeds kept down, paths leveled and cleared of rubbish. The pupils made neat tickets showing the numbers of their plots; cards, mounted on stakes, giving their names and grades; placards indicating the several classes; and still others to show the results of the scoring. Until the judges (three adult friends of the school) had finished their work, the number and class cards only were displayed. Afterwards, the three best plots in each class were distinguished as first, second, and third, and the name cards were set up. Many of the parents as well as others interested in school gardening inspected the garden during the afternoon, and many words of admiring comment and appreciation were heard.

Some attempt was made during the summer to collect and study the habits of certain insect enemies. A cage was constructed and occupied by such specimens as appeared upon the growing crops. These were fed and watched with great interest. The interest was increased by the showing of cases of mounted insects brought by the instructor from the Public Library and the Rhode Island State College.

A diversion towards the end of summer was the preparation and marketing of the maturing products of the school plots. Pupils frequently came with orders from parents or neighbors. The grocers were sometimes supplied with beets and carrots at wholesale. Receipts from these sources partly met the expenses of the garden.

The plots were scored a second time July 30th, and again September 3d. Thirty-four pupils were adjudged to have earned certificates, which were awarded Saturday, September 19th, at the close of the exhibition at Rogers Williams Park. On the same occasion prizes were awarded by the League of Improvement Societies for the four best gardens at the Manton Avenue School.

An exhibition was held at this school September 25th, in the form of a neighborhood harvest show. All pupils, except those of the three lowest grades, were invited to exhibit vegetables, fruit or flowers from their school plots or home gardens, if they had them; if not, from the gardens of friends and neighbors. Exhibit tickets were prepared by each pupil, giving, besides the name of the entry and his own name as exhibitor, the name of the grower or owner. General prizes were offered for the three collections of greatest variety and excellence and smaller prizes for the best individual exhibits. A small but sufficient prize fund was obtained by the sale of the remaining product of the school plots and of such of the exhibits as the owners were willing to have sold for the purpose. Over a hundred and fifty single exhibits were shown, some pupils entering several competitions. A very charming and creditable display of wild and cultivated flowers was the result, with a good collection of fruit and vegetables. This event marks the close of the gardening season.

The school garden is open to criticism by the idealist in education. It needs explanation. No approach to the ideal was attempted. It was a practical expedient. Strictly speaking, it was not at all a "school garden," an integral part of an educational institution, a correct pedagogical agency. It was simply a vegetable garden loosely connected with a school. It cannot serve as a model in any sense. Its whole plan was, not typical, but peculiar and temporary. The land was borrowed. The instruction was provided and part of the expense was borne by the state. The general management and the rest of the expenses fell upon the principal. The teachers of the school, though interested, took no part in the work. Another year state aid will not be available. The city is not yet ready to bear the burden of this form of education. The hope of its continuance for another year clearly lay in the possibility of arousing a strong interest in the children and their parents, so as to gain support to some means of raising funds. Whatever else was done, then, the children must get a product which would seem to them worth toiling for and the parents must be convinced that the child's labor in a garden, besides being healthful and instructive, could produce a valuable contribution to the family table.

There is abundant evidence that the desired effects have been produced. During the summer many of the parents have expressed their interest and gratification. In order to get a more complete expression of opinion, however, the parents were asked, early in

September, to reply to a series of questions which were sent home by the pupils. The replies to these questions evinced, without exception, strong approval of the garden work. In answer to one question many parents declared their intention of giving their children a garden plot at home next year. Almost all said they would favor instruction in gardening as a regular part of the school work.

This garden, then, has served the immediate purpose for which it was planned, namely, to convince the parents of the value of gardening at school, and thus to ensure their support for its continuance. It has, in addition, aroused a new interest in the possibility of home gardening and made a new opening for helpful reactions of school upon home and of home upon school. Above all, it is believed, in spite of its severely practical character, this season's gardening had been the founding, for this school and neighborhood, of a new and necessary department of child-training, where bigger influences will be at work and stronger currents of life and character are already set in motion than are possible within the bounds of any class-room education. It seems possible, in succeeding years, while holding the support of the community, to modify the character of the work in important ways in the direction of the ideal."

## The Aldrich Street School Garden.

This school is a special one for boys. The following report by Miss Sarah Dyer Barnes, is presented as it appeared in the report of the Providence school committee for 1907–08.

"Although the unpromising nature of the soil presented many difficulties, the garden, as last year, was a success. The work appeals to the boys. Even the most exasperating boy in the schoolroom works with a will in the garden.

"Under the skillful guidance of Mr. Thomas, Mr. Randall, our director of drawing and Miss Kelly, principal of the school, there was a miniature farm with its harvest of radishes, lettuce, beets and beans.

"It is my desire to send the pupils from this school to the Roger

Williams Park garden next year, as conditions there are more favorable. Association and competition with pupils from other schools are important factors.

"Miss Kelly says: 'The expenditure of time and energy which all this work entails, the systematic care and patience, two essentials which even youthful 'tillers of the soil' must acquire, and the results—gratifying or otherwise—cannot fail to uplift and influence the minds of the boys.'

"Mr. Thomas writes: 'Better results can be obtained with these boys, if a garden is provided for them in a more suitable location.'"

A copy of the following certificate was presented to every pupil that attended the different gardens regularly from May to October:

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## PROVIDENCE SCHOOL GARDENS

**Under the Auspices of the Rhode Island College League of Improvement Societies in Rhode Island State Board of Agriculture.**

THIS IS TO CERTIFY, that..............................

has successfully conducted an individual school garden at......

Providence, R. I., from May to October, 19.........

..................................

..................................

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The League of Improvement Societies offered a handsome silk banner to the school maintaining the best garden throughout the season. The pupils from Vineyard Street Grammar School won it this year.

# PROVIDENCE SEASON 1909.

In 1908, a few pupils from seven grammar schools had the benefit of a course of instruction in gardening.

In 1909, the Roger Williams garden was enlarged, and the pupils from the Aldrich Street special school were accommodated there.

Two new schools took up the work this year, the State Normal School and the Thayer Street Grammar School. The Manton Avenue School garden was discontinued, on account of the land being sold for building purposes.

As in the previous year the expenses were met by the State Board of Agriculture, and supervision was furnished from the extension department of the Rhode Island State College.

## Roger Williams Park Garden.

The Roger Williams Park garden is situated in a semi-circle formed by a curve in the lake and one of the drives. Last year it was necessary to put up a fence around the plot to keep out the sheep. This gave the garden a somewhat formal appearance. This year the park commissioners kindly consented to devote all the land inside the semi-circle, about 3 acres, for the development of a model school garden. Plans were at once drawn up, but as it was rather late in the season when the commissioners arrived at the above decision, and on account of the lack of funds, very little of the laying out was done this year. However, the garden was enlarged about quarter of an acre, and wider walks put in, including a main drive ten feet wide over which was constructed five arches, which are to be covered later with vines and climbing roses.

The piping and fitting for the arches were given to us by the park commissioners through their superintendent, Mr. Fred C. Green. It is with pleasure that the writer acknowledges the many courtesies of Mr. Green and Mr. Harold Madison, curator of the museum.

The land was prepared in the same way as last year. The department of public works donated 20 cords of street sweepings, 8 of which were used at the park, the rest was distributed among the other gardens as required. Commercial fertilizer and lime was added to further enrich the somewhat sandy soil.

Pupils from the same neighboring grammar schools attended as in the previous year, with the addition of the Aldrich street boys. The garden contained 76 individual plots 10 x 23 feet.

A border three feet wide on three sides was devoted to flowers; also borders on either side of the main drive. Most of the annuals and some perennials were grown.

An extra row of beets and turnips, and a row of onions were planted, otherwise the planting was similar to that of the previous year. (See table, page 28).

The pupils assisted with the staking out; the stakes were made in the manual training classes, at the Technical High School. One of the corner stakes was numbered; the number corresponded with the pupils tools, and with the peg on which they were hung in the tool house.

It was interesting to note that the tools purchased the previous year by the pupils who applied for a garden again this year, were in excellent condition, showing that they had not forgotten what they had learned regarding the care of their tools.

In addition to the garden work the pupils studied the birds, insects, trees, shrubs, wild flowers, and aquatic vegetation. They also made simple meteorological observations, and some planting, cultivating and other experiments, which will be described later.

There were 76 pupils who started the work in May, and 66 of them attended faithfully until the end of the garden season in October. The ten delinquents lost their gardens through irregular attendance.

The plots were at once taken over by other pupils, whose names were kept on a waiting list.

The pupils were divided into two groups, each group attending the garden for instruction, two afternoons a week from 3:30 to 6:00.

In 1908, the average value of products raised in the individual school gardens was $5.00, in 1909, the average value was $4.00. The decrease is due to the very severe drought of this season.

We are indebted to the fire commissioners for the use of fire hose and nozzles during the summer.

The surplus flowers from the park garden were sent to the hospitals in the city.

### The Exhibition.

An exhibition of vegetables and flowers from the school gardens in Providence took place at the park garden on Saturday, September 25th. Prizes were awarded to the pupils having the four best gardens at the Normal School, Thayer Street, and at Roger Williams Park; also for the best exhibits of vegetables and flowers.

The school garden banner, offered by the League of Improvement Societies, for the best school garden was won this year by the pupils of Thayer Street School.

Dr. F. P. Walker, Providence school committee, Mr. William Williams, chairman of the executive committee of the State Board of Agriculture, and Mr. Nathan S. Kingsley, principal Doyle Avenue Grammar School officiated as judges of the gardens; and Mr. C. W. Smith, State Horticultural Society, Miss Isabel Holbrook, State Normal School, and Mr. Sidney A. Sherman, English High School, judged the exhibits. Mr. Luther Burlingame, secretary of the League of Improvement Societies addressed the pupils and presented the prizes.

### The Aldrich Street Pupils.

In last year's report, Miss Sarah Dyer Barnes, first assistant superintendent of schools, stated that she wanted to send the pupils from this special school to the park garden this year. It was ex-

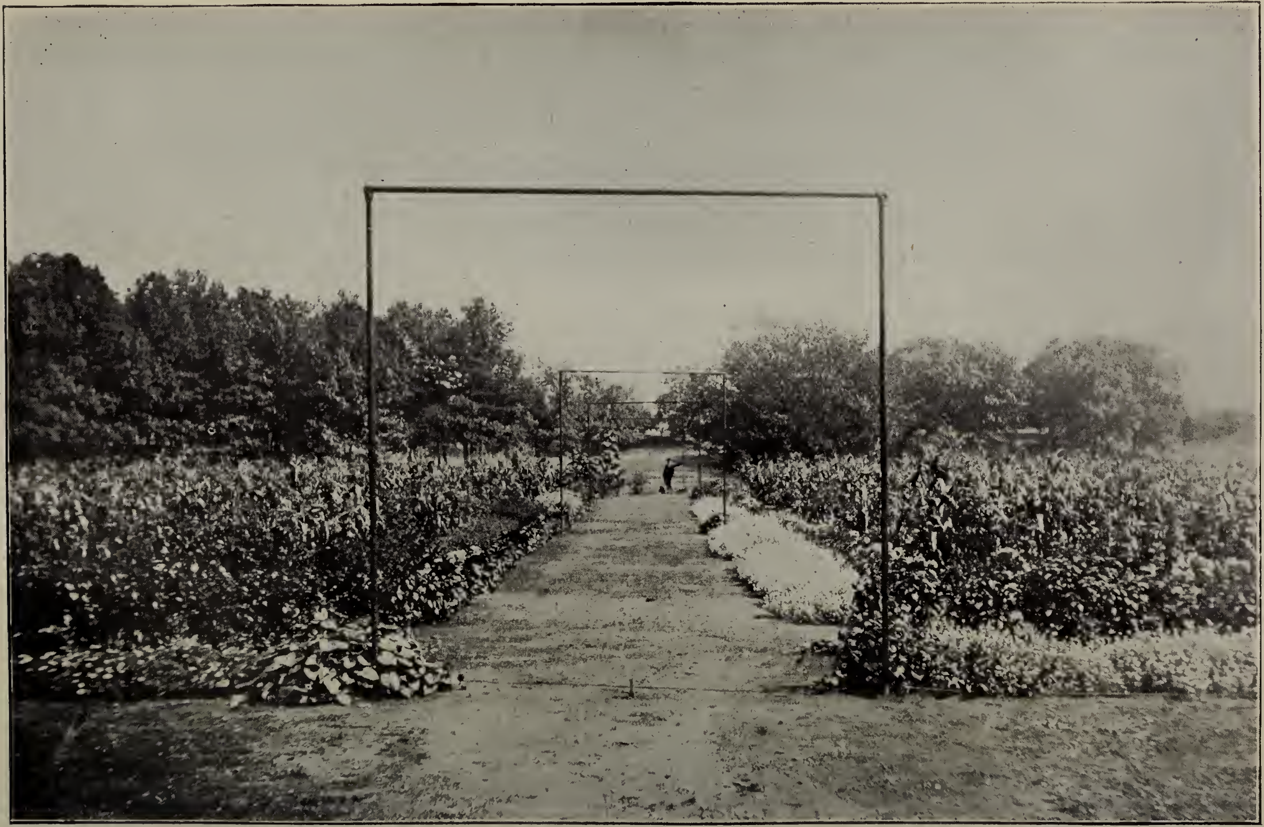

PLATE VII.—School Garden, Roger Williams Park. Center walk, showing arches for vines.

pected that association and competition with other boys would produce good results. This was so. The boys did excellent work. At the close of the school, however, most of the boys had to find a position for the summer. Three of them attended the garden regularly all through the season and one won the first premium for an exhibit of vegetables.

### The Normal School Garden.

A corner of the Normal School park was spaded up and fertilized. This garden contained 40 individual plots, which were 6 x 8 feet. They were divided in half so that 80 plots were available, each one 3 x 8 feet.

Pupils from the sixth grade planted and cared for one-half, and the normal students (junior A class), the other half.

The students were instructed first, in the class room, where short talks were given upon the preparation of the soil, planting, fertilizers, staking out, etc. The class was then taken outside and the individual gardens were planted. The sixth grade pupils were then brought out, and the students instructed them in the planting and care of the gardens.

Miss Isabel Holbrook and Miss Mary A. McArdle assisted with the general supervision, and gave much valuable assistance.

Plants of a dwarf bushy nature were planted such as bush beans, dwarf peas, beets, carrots, lettuce, radish, and dwarf tomatoes.

A border three feet wide on three sides was given up to annuals. In the border on the west side, the students planted geraniums, begonias, and other house plants which they propagate earlier in the year.

The pupils that cared for the four best gardens were awarded prizes at the exhibition held at the Roger Williams Park garden in September.

The expenses in connection with the Normal School garden were met by the school.

### Thayer Street.

Through the kindness of the late Mrs. H. I. Russell the school was granted the use of a very desirable lot for the purpose of a school garden. The lot is in an ideal situation, opposite the school house and in full view. The fact that it borders on three streets gives it the greatest publicity.

The seventy boys and girls who had garden plots for the season were children who would spend the summer vacation at home.

The plots were each 22 x 13 feet and were separated by convenient walks. The border on three sides, five hundred feet in length, was occupied with flowers.

Throughout the summer the children manifested a great amount of interest. With very few exceptions, attendance at the appointed hour was regular and the work faithfully done.

The banner given by the League of Improvement Societies for the best garden was awarded to the Thayer street pupils this year.

As in all of the gardens intensive methods of cultivation were adopted; when a crop matured it was removed and another one planted if space allowed.

The principal, Mr. Winslow, is a firm believer in the work; he is a pioneer in agricultural education. The success of this garden is due largely to Mr. Winslow's efforts.

## PROVIDENCE SEASON, 1910.

Two new school gardens were started in Providence this season: one at the Vineyard Street Grammar School, and the other at the Slater Avenue Primary School. Altogether there were nine grammar schools and one primary school represented, carrying on the work according to the plans inaugurated three years ago by the League of Improvement Societies in Rhode Island, the Rhode Island State College and the State Board of Agriculture.

As in the two previous years, the expenses have been met by the Rhode Island State College and the State Board of Agriculture. The expenses in connection with the Normal School and the Slater Avenue

Primary School were met by the Normal School and Slater Avenue Mothers' Club.

### Roger Williams' Park Garden.

Each year this garden has been enlarged, otherwise very little has been done towards the development of a model school garden. It is highly desirable, that funds should be provided for the development of an ideal garden such as we have in mind. We hope that in time this garden will be made a veritable laboratory for "Health, Pleasure and Education," not only for school children, but for the general public as well. It has fulfilled this object in a limited way for the past three years. The gardens are visited annually by several parents who come to see their children at work. The pupils are encouraged to answer all questions as to the names of the varieties of vegetables and flowers grown. In many cases parents have realized the possibilities of a small piece of land, and have provided a garden at home, in which their children might apply on a somewhat larger scale what they learn in the school garden. In this way many homes have been brightened, and the household expenses considerably reduced.

Many teachers, and others interested in the movement, have visited the garden at different times, not only from Rhode Island, but from other New England states.

The model school garden towards which we are working should have not only hardy vegetables and flowers of every description, but one or two specimens of the most desirable ornamental trees and shrubs, also specimens of the different fruit trees, the cereal grains, and other economic plants, such as hemp, flax, etc., a wild garden, water garden, and a botanical garden, a lecture room and tool house.

From the foregoing, it might be inferred that we are trying to develop a school of horticulture. A course of study in such a school garden would be a splendid base for any one intending to follow that delightful and profitable business; but to disseminate a knowledge of horticulture is not the primary object of the school garden.

Many spiritual, ethical, and economic lessons may be taught in the school garden. Horticulture is a means, not an end.

The same general methods were adopted as in previous years, with the exception of a few minor changes which were found desirable. Rambler roses and clematis were planted to climb over the arches erected last year.

The garden contained 76 individual plots each 10 x 23 feet. Most of the common vegetables and flowers were planted, and luxuriant crops were obtained. The average value of the products from each plot amounted to $5.50. Many cases of improved health and brightened pupils have been brought to our notice, the value of which can not be estimated by dollars and cents.

### The Exhibition.

On September 14th, 1910, the third annual exhibition was held at Roger Williams Park. Excellent exhibits of vegetables and flowers were put up by the pupils from the different school gardens in the city. Prizes were awarded for the best exhibits and for the best individual gardens. Each pupil who had attended the gardens throughout the season received a diploma as in previous years. Mayor Henry Fletcher was present and in addressing the children, expressed his satisfaction with the work which they had done so faithfully.

"In doing this work," stated the mayor, "you are not only bringing out beauty that is hidden, but you are creating in your lives ideals which will make you and your friends happier."

The following ladies and gentlemen kindly officiated as judges: Exhibition:—Mrs. John Nicholas Brown, Newport; Mrs. Sarah E. Doyle, Mrs. A. deF. Palmer, Mr. G. F. Weston, Mr. C. W. Smith of Providence. Gardens:—Dr. Francis P. Walker, Providence school committee; Mr. William S. Steere, principal Webster Avenue Grammar School; Mr. William Williams, chairman executive committee, State Board of Agriculture.

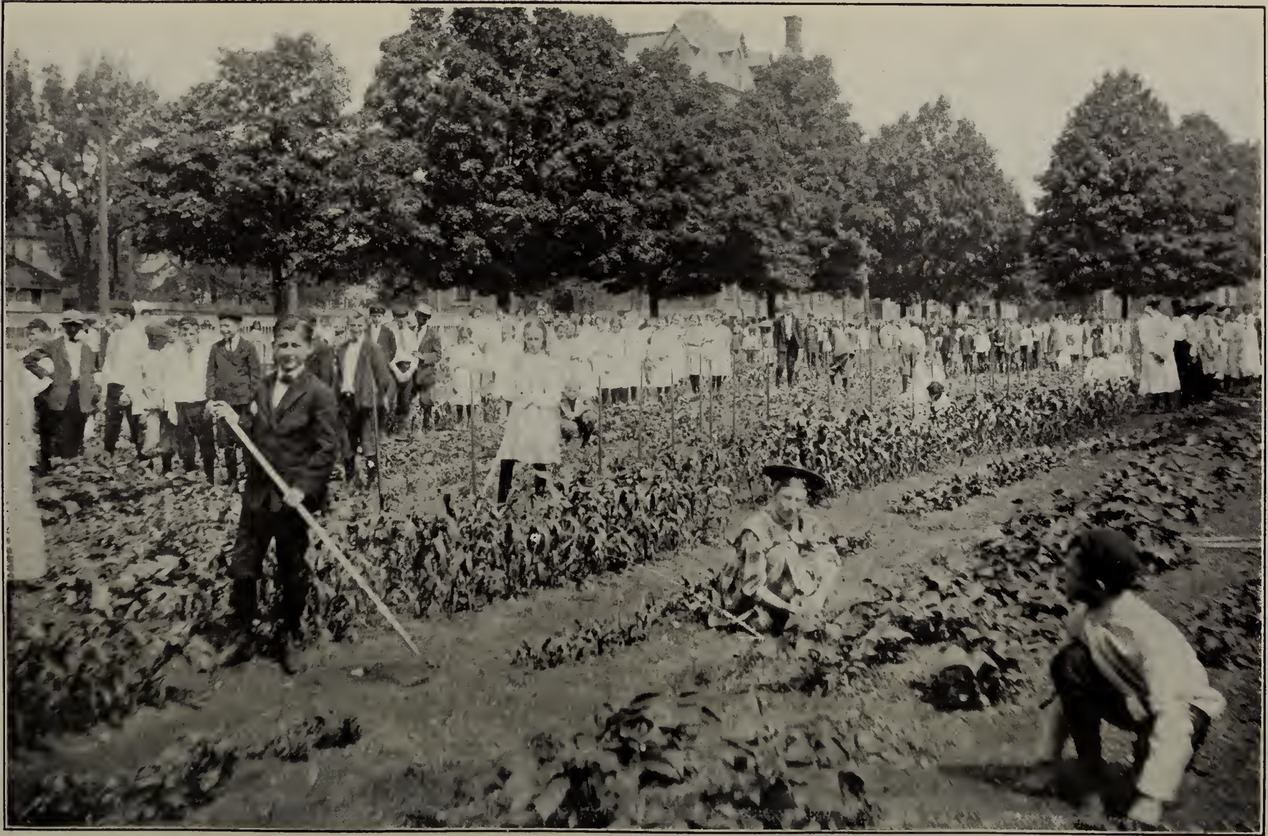

PLATE VIII.—Thayer Street, School Garden, Providence, R. I. Contains 72 individual gardens, 11 x 23 feet. All the pupils in the school visit the garden periodically.

### Wins in National Contest.

The Roger Williams Park garden was entered in a national contest conducted by the Doubleday Page & Co., New York City, publishers of the Garden Magazine. We are pleased to announce that it was awarded first prize in the class in which it was entered, namely, "for the best garden of three years or more cultivation."

### Thayer Street.

This is the second season the pupils of this school have had the use of an excellent lot through the kindness of the late Mrs. H. I. Russell.

Seventy-six pupils had individual plots 11 x 23 feet and raised large quantities of fresh vegetables, which were very much appreciated by their parents.

A border three feet wide, on three sides, was planted with annuals which made a fine display throughout the summer.

The principal, Mr. I. O. Winslow, who has recently been appointed first assistant superintendent, had charge of this garden and is responsible for its very marked success. Mr. Winslow sums up the advantages of the school garden as follows:—

"1. On the economic side, the children have learned to cultivate a small vegetable garden in the best and most profitable manner.

"2. They have taken home for the family tables supplies of fresh vegetables of considerable value.

"3. They have had genuine manual training of a kind that everybody approves.

"4. They have had experience in personal ownership and have thus learned to take pride in the sense of possession and to respect the property rights of others. As a means of increasing the sense of personal possession each child was required to purchase the necessary seeds for his garden.

"5. On the sentimental side, the care of growing plants has undoubtedly brought out the finer nature in children who otherwise are inclined to be heedless and destructive."

On the community at large the garden has had a wholesome influence. Boys who ordinarily have no hesitation in stealing and committing malicious acts have the greater respect for the gardens because their friends are among the owners of them.

All the people appear to have higher regard for the public schools when they can see such material results of work with the children's hands.

In view of the result of this and other similar experiments it is to be hoped that the city will be willing in the future to make public provision for the necessary assistance in the support of such undertakings.

### Normal School.

The Normal School garden was enlarged this year to three times its former size. The principal, Mr. John L. Alger, is a pioneer in the school garden movement in America. At this school the work was placed where it belongs in the curriculum of the school. The garden contained eighty individual plots, each 8 x 12 feet, with a border three feet wide on all sides, three of which were planted with flowers, and the other one with important economic plants.

All pupils in the fifth and sixth grades were required to study the garden work just as regularly as their other studies, and needless to say, they enjoyed it, perhaps more than any other study.

The Normal School students of the Junior A class planted the flower borders and had practice in the supervision of the grade pupils. The theoretical part and the work that should be done in the garden was explained to the students in the classroom. Immediately afterward the students took charge of the grade pupils and instructed them in their work. The assistance given by the critic teachers, Miss Mary A. McArdle of grade six, and Miss Jennie S. Aull of grade five, was very valuable and much appreciated.

The third and fourth grade pupils and the kindergarten children planted flowers in the borders around the building. The pupils at this school collected enough old rubber to pay for the seeds and plants used. The other expenses for the plowing, fertilizing, etc., were assumed by the school.

## Vineyard Street.

Through the energetic principal, Mr. Frank A. Spratt, recently appointed principal at Thayer street, a lot across the street from the school was loaned for school garden purposes by Mrs. E. H. Munroe. Twenty-one pupils planted as many individual gardens, each 10 x 20 feet, with vegetables, also a border three feet wide on two sides with flowers.

Although this garden is exposed on two sides to much used thoroughfares, not a leaf was destroyed, except in a single instance, and then by a gang from another district.

Formerly there was a footpath through the lot, and one might easily step from the pavement into the garden, yet there was never any evidence of trespassing. This speaks well for the oft repeated claim that "school gardens teach private care of public property."

## Slater Avenue.

At this school every pupil has the opportunity to virtually own a piece of land. The vacant lot adjoining the school was loaned for the purpose by Dr. E. M. Harris.

It was plotted out into 66 individual gardens, each 7 x 9 feet. Two borders six feet wide were planted with flowers, and one with economic plants. On the east side of the school, a plot 50 x 20 feet, was planted with pop-corn.

The garden work here was a part of the regular school work, and the teachers made excellent use of it by correlating it with the other school studies. Excellent results were obtained and the judges considered this to be the best school garden in the city and awarded it the "banner" given by the League of Improvement Societies in Rhode Island. The expenses in connection with this garden, with the exception of commercial fertilizer, were assumed by the Mothers' Club. The children gave a concert and raised enough money to pay the expenses of the garden, and a small salary to the janitor for assistance during the summer, and have enough left to start a garden next spring.

## Portuguese Mission Garden.

BY ERNEST K. THOMAS.

During a conversation with Miss Francis, who was in charge of the mission, regarding the home conditions of the Portuguese, the writer suggested starting a garden for the benefit of the children in the neighborhood. The matter was brought before the pastor of the Central Congregational Church, which supports the mission, and it met with general approval. It was expected that a garden would furnish a part of the much-needed fresh vegetables for the table, as well as provide a pleasant and profitable occupation for the children.

Efforts were made to secure a vacant lot in the Portuguese section of the city, and after many disappointments, permission to use a lot on Gano street was granted by the owner, Miss Mary E. Young.

The lot was once used as a lumber yard and had a high board fence all around. It had not been used for some time and needed considerable working to put it in shape for planting. The weeds were first cut down, then two cords of street sweepings were plowed under. Two hundred pounds of lime and 250 pounds of commercial fertilizer were also harrowed into the surface soil. The boys made stakes for plotting out the individual gardens in the manual training classes at the mission. The children staked out the gardens and planted the following crops: corn, lettuce, radish, peas, cabbage, carrots, beets, tomatoes, and beans. The tools and seeds were furnished by the church.

The results expected from this garden were fully realized. The pupils took great interest in the work, as did their parents, who often came and watched them work in the garden and to see how the fresh vegetables were obtained.

One thing that impressed the writer was that many of the pupils and parents did not know how to cook or prepare some of the common

PLATE IX.—"We raised them." Exhibit of Vegetables. School Garden, Roger Williams Park, Providence, R. I.

vegetables; in one case a little girl wanted to know what radishes were and how to "cook um."

The vegetables raised were much appreciated in the homes, and in some cases the parents started small vegetables gardens in their own backyards.

All these people and many others in similar circumstances need, is someone to show them how. They dislike to be made objects of charity, and would prefer to earn a comfortable living by their own efforts if they had the opportunity. No money spent for charitable and philanthropic purposes will yield better returns than when invested in this way. Teach these people to be "producers," to take at least a part of their living from the soil, and at the same time teach the children the principles of plant and animal life, and instill a love for the country and the beautiful in nature by a well organized system of school gardens, and you have gone far along the road to eliminate much of the poverty in cities and dissatisfaction with rural life.

"Cultivation of the soil is basal to civilized life. To educate children without it is to relapse to barbarism. To have every child during ten years own and care for a garden, however small, would do more than anything else to empty our prisons."

Dr. C. F. Hodge,
Clark University.

## PRELIMINARY REPORT, PROVIDENCE, 1911

This report goes to the printer with the school garden work in Providence on a more permanent basis than in any previous year. The school garden committee has felt that if this work was to be a permanent part of the school system, it should be officially recognized and supported by the school committee. A communication was presented to the superintendent of schools, Mr. Randall J. Condon, who brought the matter before the committee at the April meeting. The following account is taken from the printed records of the school committee:

"I wish to present for your serious consideration and action at this time, the matter of school gardens. At the February meeting a communication was received from the committee on school gardens of the League of Improvement Societies in Rhode Island. This communication not having been referred to any committee, not having appeared in print, and not having been read at the time of its presentation, as I remember it, has not yet received the consideration to which, on account of its importance, it is entitled.

"The committee presenting the communication is composed of Mrs. Mary E. S. Root, Dr. Helen C. Putnam, Professor A. E. Stene, Mrs. John L. Alger, J. E. C. Farnham, and Victor Frazee. They have set forth so fully the history of the movement in Providence, so clearly the educational value of the gardens as a feature of city school life, and present so strongly the reason why some action should be taken by the school committee with reference to the matter, that I quote almost in full the communication both for the sake of bringing the subject clearly before you at this time and that this excellent statement may appear as a part of the printed records:

"School gardening for children in the grammar schools of Providence began in 1908. The work then introduced became possible through the interest of President Edwards and the Board of Managers of the Rhode Island State College, with the assistance of the State Board of Agriculture. The Extension Department of the college engaged an instructor a thoroughly competent man, Mr. Ernest K. Thomas. In the first year, a garden occupying about half an acre and accommodating nearly seventy pupils was established in Roger Williams Park. Pupils attended from Broad, Peace, Vineyard, Oxford Street and Lexington Avenue Schools. Each class attended two afternoons a week throughout the season, including the summer vacation. An exhibition of products was held at the end of the season and prizes were awarded by the League of Improvement Societies.

"At the Manton Avenue Grammar School a garden of about the same size was carried on by sixty-four pupils of that school on seven adjoining house-lots loaned for the purpose.

"Small gardens were conducted at the State Normal School, Aldrich Street Special School and the Fresh Air School.

"In 1909, the work at the Park was continued on a somewhat larger and more diversified scale. Much more attention was given to æsthetic effects by the planting of wide borders of flowering plants.

"The Thayer Street School Garden was conducted, as was the Manton garden of the previous year, by the joint labors of Mr. Thomas and the principal of the school. It accommodated about seventy children.

"Aldrich Street pupils attended the garden at the Park.

"Last year, gardens were in operation at Roger Williams Park, at Thayer Street, Vineyard Street, Slater Avenue, Academy Avenue Special, Burnside Street, and Smith Street Special Schools, and at the State Normal School. These gardens, together with those carried on outside of Providence, taxed the time and energy of the director to the utmost, so that plans for separate gardens at Peace and Oxford Street Schools had to be abandoned for lack of the necessary assistance.

"School gardening has been carried on by the pupils of these schools with the greatest enthusiasm and success. Parents have been questioned in detail regarding it and are almost unanimously favorable to it and eager to have it continued and extended. Principals and teachers who have assisted in the work have found it to have the highest educational value. City life for children has come to be sadly empty of real, wholesome, active experiences, such as trained the powers and developed the characters of children of earlier generations. School life deplorably reflects this barrenness of experience. Children cannot be made to grow into resourceful, dynamic men and women by the study of books. If they are to do anything as adults they must do something as children.

"School gardening affords an opportunity to engage in practical activity of the most wholseome kind. It becomes, for the child fortunate enough to take it up, an enterprise which looms big to him. It permits him to plan for a whole season's work, to devote willing, eager labor to a project which he adopts as his own. It demands persistence; it punishes neglect with miserable failure; it rewards character with tangible success. It teaches the dignity of labor and the value of forethought and faithfulness. It gives an experience of property; arousing feelings of loyalty to government as guaranteeing ownership, and of resentment against the lawlessness that violates ownership,—which is of the highest value in the development of good citizenship. It presents elements of inter-dependence and co-operation which are invaluable in this age of combination. It awakens and develops the whole nature of the child. Under its stimulus he increases in physical, mental, moral and social stature.

"Efforts are being made in the best schools in the country to put life and efficiency into the formal subjects of the course of study by relating them closely to the various kinds of manual or occupational work. Gardening has been found to be one of the best of all occupations for this purpose. There is no better correlating center for the course of study.

"In the view of the undersigned committee, the garden work in this city has met with such favor and has proved so successful as an educational agency that, regardless of other considerations, it is proper and highly desirable that it should be maintained and extended under the direct authority and management of the school department of the city. The matter is brought urgently to the attention of your honorable body at this time for the reason that the future of the work in this city is threatened by lack of the factors necessary for its continuance and further development. The work in the state as a whole has grown quite beyond the capacity of one instructor. The State College, while it is very anxious to continue and develop the work in Providence, feels that it must heed some of the more urgent calls from outside this city and lend its aid to the development of the work in other parts of the state. Gardens have already been established in Newport, Warwick, Pawtucket and Lonsdale. It may be desirable that the State College should continue to exercise a general supervision over the gardens in Providence. But it is impera-

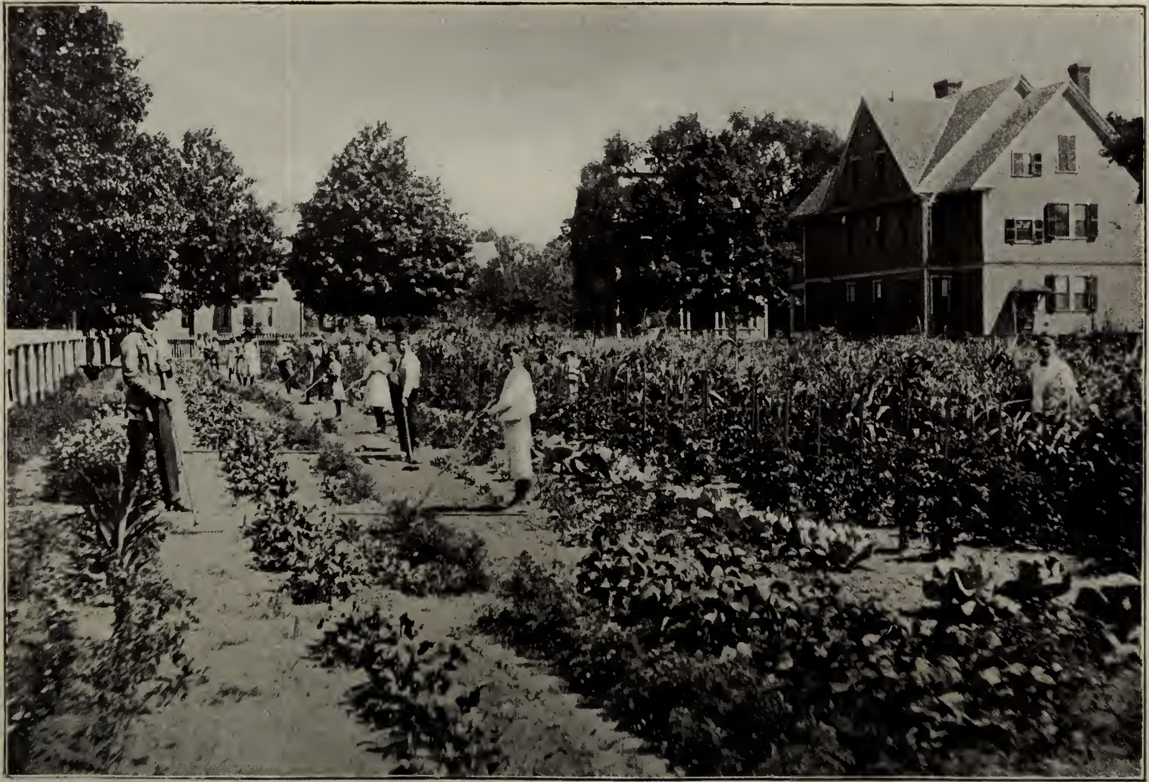

PLATE X.—School Garden, Thayer street, Providence, R. I.

tive, if the work is to go on as already developed, that the city shall provide for the direct instruction of the children and for incidental expenses.

"The undersigned would therefore respectfully urge that the School Committee take such action as shall authorize and enable the Superintendent of Schools to provide for the continuance during the coming season of the school gardens already established in Providence, and to establish others from time to time, as conditions permit."

"It is unnecessary for me to give additional arguments, as to the value of the school gardens, or reasons why they should be fully recognized and supported by action of the school committee.

"When I visited the school gardens of this city last June, I found them so intelligently administered, so thoroughly developed, and apparently so strongly intrenched as a part of the school system that it did not occur to me that the question of their continuance and extension would ever be raised. I did not realize then what I had come to understand since that while they have been informally recognized and permitted by the School Committee, while large numbers of children have been receiving instructions in them both during term time and vacation, and while the teachers and principals have actively co-operated in the work, yet the city's direct expenditure in their behalf had been limited to the printing of extracts from the reports of the representatives of the State College in charge of their direction.

"This in itself seems to me an anomaly which should not continue, even if there were not other important considerations which make it important, as set forth in the statement which I have quoted, that some action be taken at this time if the work is to be continued and extended. The direction of the movement so far has been in the hands of the officials of the State College. The expenses incidental to the work have been met largely from their funds, supplemented by contributions from private individuals, mothers' clubs, or other interested organizations.

"While permitting the work to be carried on for three years in connection with the schools, the School Committee has had nothing to say officially as to its direction and has assumed no responsibility for its maintenance. The time has unquestionably come for the School Committee to assume the responsibility both for the support and direction of the work. In fact it is necessary for this to be done, if the movement which has had such a satisfactory beginning and has been so well developed during the past three years is to be continued for the present season.

"The officials of the State College are favorable to the continued co-operation of the state in the work in this city in so far as that co-operation does not deprive other sections of a share of the assistance to which they are equally entitled. The increased requests for help from other communities will, however, make it necessary to reduce the time and funds which the State Board of Agriculture can devote to the work in Providence.

"In order to undertake the necessary initiative this year, some of the principals have had to assume personal responsibility for the expenses for plowing, fertilizing, etc.

"To sum up the situation without further discussion:—If the school Committee desires to see the school gardens continued and extended, it will be necessary to take action at this meeting to recognize them as an integral part of the school work and to authorize—in addition to what the State College may be able to contribute, the expenditures necessary for their maintenance.

"School gardens are no longer an experiment. They are to be found in every section of the country, alike in the small towns and the large cities. Private initiative and the co-operation of the State College have made possible a substantial beginning in Providence. I should consider it a serious mistake and misfortune if the school committee failed to take advantage of this beginning, and assume at this time responsibility for their direction, maintenance and extension.

"I desire to see an official recognition of that co-operation with the State College which will continue to afford a general expert supervision by those who are directly charged with the duty of advancing the agricultural interests of the state. I wish, too, to see the work not simply permitted, but officially recognized, directed and supported so far as may be necessary, by the city.

"A careful estimate of the requirements gives $500 as the additional amount needed for this season. This will include an allowance of $250 for the employment of an assistant at $50 per month, to work under the direction of Mr. Ernest K. Thomas, who will continue as the state's representative in general charge of the direction of the work. The additional $250 will be sufficient for plowing, fertilizers and incidental items. The children who cultivate the gardens will supply their own seeds.

"To put the matter into definite shape, I recommend the passage of the following resolutions:

"Resolved, That in recognition of the school garden as a valuable educational agency the same should be and hereby is adopted as a part of the school work under the immediate direction and control of the officials of the school department.

"Resolved, That the sum of $500, or so much thereof as may be necessary, be and hereby is made available for their maintenance for the present season, to be expended under the direction of the Committee on Summer Schools,—in the employment of an assistant teacher or director and for such other items of expense as in the judgment of said committee may be necessary.

Respectfully submitted,

RANDALL J. CONDON,
*Superintendent.*"

Providence, R. I., April 28, 1911.

The above resolution was presented and carried. An assistant was employed to take charge of the gardens in Providence.

The gardens at Roger Williams Park were enlarged and a number of dwarf fruit trees, provided by the State Board of Agriculture, planted. Thayer Street, Slater Avenue, and the Normal School gardens are being carried on in much the same way as last year.

Mr. Martin S. Fanning, principal of Oxford Street Grammar School, secured permission to use a lot near the school for garden purposes. The land was so uneven and full of weeds that it was decided to let the boys grow corn on the lot for this year and enter the boys' corn growing contest, which is being carried on in Rhode Island. It is expected that frequent cultivation which the corn requires, and the fact that it is planted in drills three feet apart, will enable the boys to keep out the weeds and render the soil in better condition for garden crops next year.

Mr. Victor Frazee, principal Veazie street school, will probably start a large garden in connection with his school next year.

The Portuguese Mission is in charge of Miss Jessie Holt this year.

## PROVIDENCE PRIMARY SCHOOLS.

By Miss E. L. Sweeney, Second Assistant Superintendent.

The study and observation that can be done in the great and glorious out-of-doors in a rational, every-day way, has been accentuated as strongly as possible during this past school year. We have endeavored in our garden work to pursue a sane policy and make our work an integral part of the regular school work.

Limitations of space in school grounds have forced us into intensive gardening, which, doubtless, is the most effective and educative method, because it impresses upon the children an appreciation of the yielding capacity of a small plot of ground. We have found then, when it is possible to have a garden in a school yard, it serves as an object lesson to all the children, and although they are not all able to engage actively in cultivation, they have had the experience of seeing other children in their work. As a result of the stimulating influence of such observation we have had in Providence this past year many well-planned, well-planted and well-cared-for home gardens in as many back yards. The most important phase of school gardening is not gardens at school, but children's home gardens. The most promising feature of our work is that it is strongly progressive. Children do

PLATE XI.

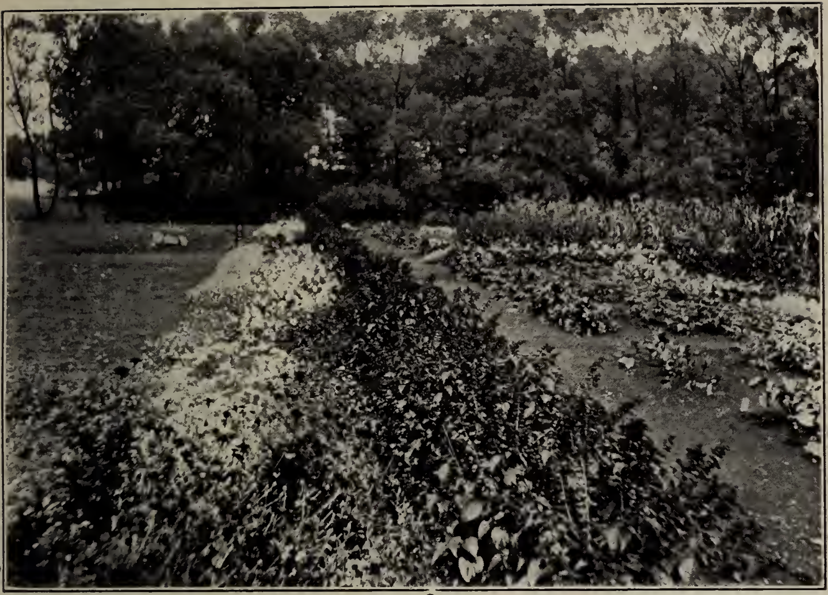

Fig. 1.—Border of Flowers. School Garden, Roger Williams Park, Providence, R. I.

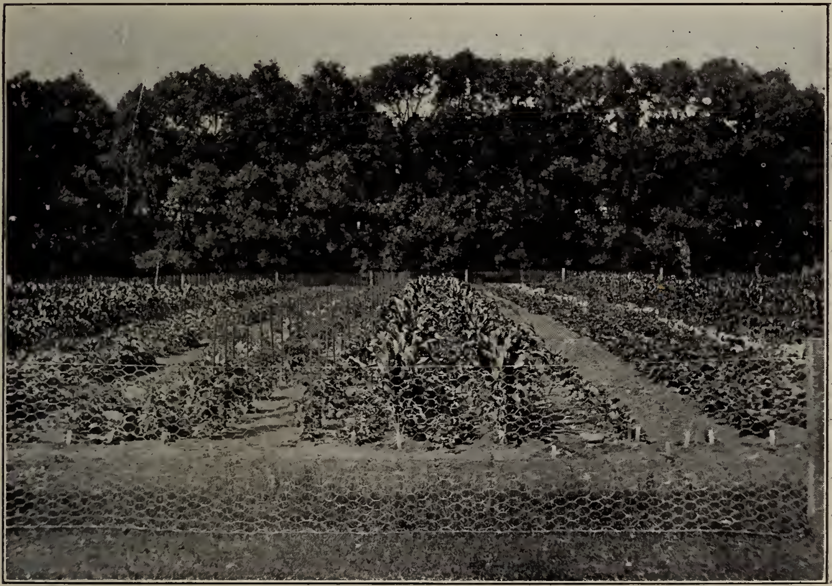

Fig. 2.—School Garden, Roger Williams Park. Contains 72 individual gardens each 10 x 20 feet. Crops planted so as to give the appearance of one large garden.

better work each year, and the gardens give evidence of increasing knowledge.

My plan is to see that the general principles of gardening are developed by experiment and discussion and taught in the nature study period. In the school garden the children should apply these principles and then there should be abundant, free, independent practice in the home garden.

This garden work is not a new phase of education, but an old one which is steadily gaining the recognition and support its importance merits. The real school garden is for purposes of direct instruction. It is an outdoor laboratory and should be considered as much a part of the school equipment as books, blackboards, etc. A definite amount of money should be given to each school for its garden work so that all schools could have the school garden. The prime motive of this work is not to be ornamental but useful, and the garden should be a good garden if it is to do its best work. Nearly every school now has a garden; some are pretentious, some are very small. The instruction aroused among the children has naturally spread to their homes. The instruction gained at school should find its practical application in the individual home gardens of the children. If the full purpose of the garden work is carried out, it means more than the training of the hand in doing its part of the work successfully. It means a training of the eye to see things as they are, a training of the mind to think logically, to draw conclusions, and to recognize the dignity of work.

# SCHOOL GARDENS IN OTHER PARTS OF THE STATE.

## PAWTUCKET.

### Cherry Street Primary School.

By Miss E. E. Finlay.

Froebel says: "It is of the utmost importance that children should acquire the habit of cultivating a plot of ground long before the school life begins.

"Nowhere as in the vegetable world can his action be so clearly traced by him entering in as a link in the chain of cause and effect."

For many years the teachers of the Cherry Street School have been most anxious to have a garden in connection with their school, and last year, through the kindness of Mrs. M. B. Arnold, who kindly loaned her lot on Barton street, they were able to carry out their plans.

On March 28, 1910, after a visit from Mr. Frank O. Draper, superintendent of schools, who is deeply interested in the success of the experiment, the children eagerly began work in the lot which was filled with the refuse of years, and their enthusiasm quickly spread to other quarters.

As the question of ways and means was a serious one, the teachers were very grateful for donations of lime, fertilizer, and seeds. Mr. Peckham, the overseer of the poor, had the lot plowed and harrowed and the men working for the street department were most kind in bringing the street sweepings. The school janitor, Mr. Ford, anxious to help the good work along, put up a wire fence on the Barton street side and made a gateway from the school yard into the lot.

Knowing that the final success of a school garden is the development of the home garden, it was most important that the advice of someone with experience in this work be secured to direct the planning and laying out of the plot. The school has been most fortunate in securing the assistance of Mr. E. K. Thomas of the State College, Kingston, R. I., who comes every week to instruct the teachers and pupils and who is untiring in his efforts in behalf of the movement.

The children are very much interested in the preparation of the soil and in the sowing of the flower and vegetable seeds, as the outdoor work serves as a basis for lessons in the class room in spelling, number, language, drawing, and nature study. In the fourth grade the pupils keep a diary of the work done each week, and this has proved of much interest the second year as a comparative record of the crops planted, for we learn to do by doing.

In the summer of 1910, Mr. Harlan R. Mackenzie and Mr. A. Ralston of the Y. M. C. A., visited the garden with the children twice a week for the purpose of weeding it and caring for the crops, which were sold in the neighborhood, and much of its success was due to their able supervision.

During the present summer it is in charge of Mr. Edward Hockhauser and Mr. C. E. Starrett, who are so deeply interested that success is assured.

The work the first year was most enjoyable and at the close all were encouraged to find that even financially the garden was a success.

Owing to the condition of the soil some of the crops failed, yet we feel that our failures are but stepping stones to something better in the future.

Following is a report of the vegetables raised during the first season:

| | |
|---|---|
| 32 dozen corn | $3 84 |
| 40 bunches radish | 1 00 |
| 35 bunches beets | 1 60 |
| 40 head lettuce | 1 25 |
| 38 head cabbage | 1 36 |

| | |
|---|---|
| 125 quarts beans | $6 25 |
| 40 quarts peas | 1 00 |
| 80 quarts tomatoes | 4 00 |
| | $20 30 |

In the winter of 1911 our plot was hired for a lumber yard and for many weeks it seemed as though our garden work would have to be abandoned. Disappointed, but not discouraged, we started out with renewed interest, and teachers and pupils were again happy when they secured the lot on Cherry street owned by Mrs. Olive M. Ormsbee and found that the friends who aided their first efforts showed renewed interest, and new ones were constantly added to the number.

The State Board of Agriculture kindly furnished fertilizer and tools, and the school is much indebted to Mr. Isaac Gill, who had the garden piped for water.

Thus equipped the children began work with a will, showing a marked improvement over the work done the previous year. Every passer-by became a friend of the movement, and anyone who has seen the pupils measuring the garden, staking it off and planting the seeds soon realizes that the teaching of agriculture is not a fad, but one of the most practical subjects connected with the school work. Its results have been far-reaching, for experience has shown that the raising of the crops has been but a small part of its real value, as it has served as a bond (and a very strong one) between home and school, bringing the teacher and the pupil in closer sympathy, and has resulted in an increased percentage of attendance. The growth of respect for property rights has been noticeable, for during the year not a single complaint has been made about pupils destroying fruit or flowers in the neighborhood.

It has been truly said: "Give the boys gardens for ten years and it will empty the prisons." The children have learned through their own experience that to be successful they must work diligently and in an orderly manner and must respect the rights of others, and in learning this they have learned the first essentials of good citizenship.

PLATE XII.

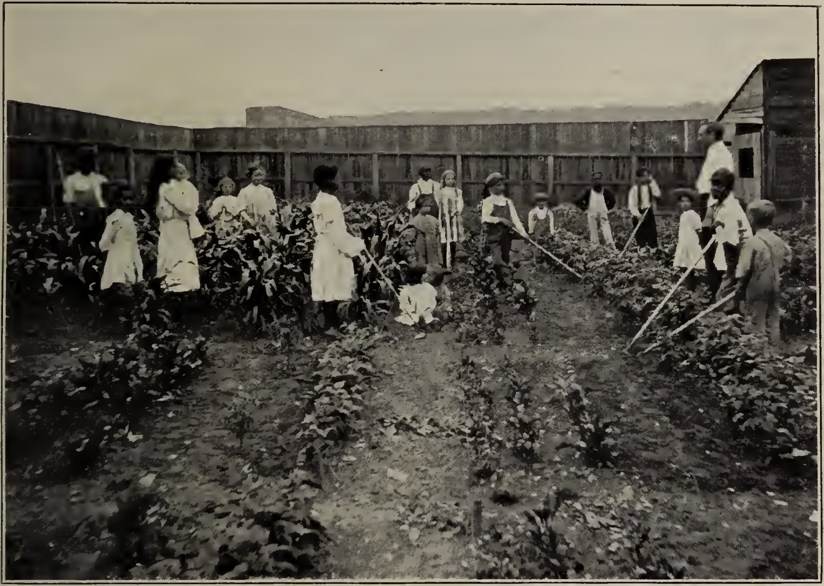

FIG. 1.—Portuguese Mission. Children's Garden. Providence, R. I.

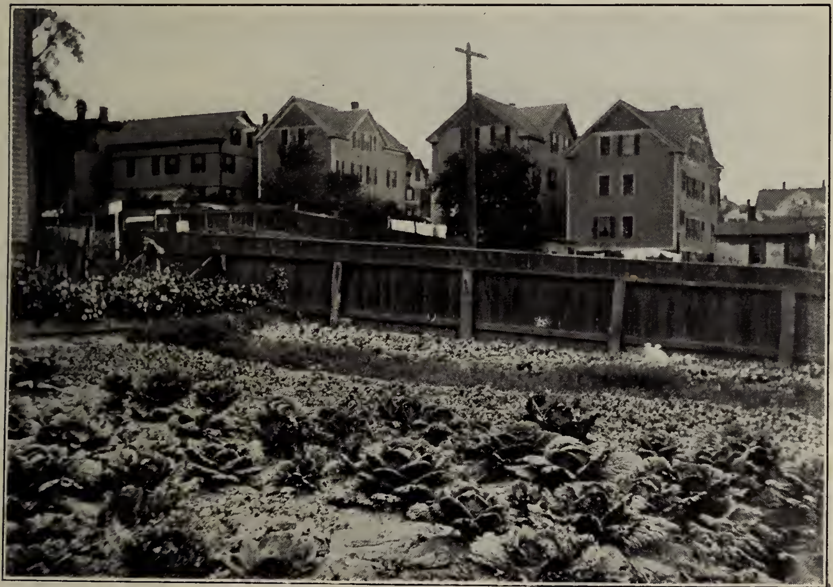

FIG. 2.—Home Garden, Portuguese Section, Providence, R. I. Result of children's garden work.

We would heartily recommend "school gardens" to all who are interested in the moral, mental and physical development of our boys and girls.

## Cherry Street Kindergarten.

### By Miss A. M. Perkins.

Children's gardens have been conducted at Cherry Street Kindergarten under almost ideal conditions for the last twelve years.

As the kindergarten deals with beginnings, the gardening there is of the simplest kind and is of more value for the interest aroused and the lessons taught than the material products.

The four-year-old children have one garden together and do as much as possible for such little people, but it amounts to little more than arousing an interest in the work; but each of the five-year-old children has his own garden three feet square. They are provided with tools of proper size, so do their own spading, clearing of sticks and stones, and raking, and working in fertilizer.

One of the chief objects of the kindergarten is the interpreting of children's experiences. Long before the time of gardening children have had many experiences in common and begun to understand the value of them. They have seen the nurture of bird life, and animal life, and of the human family, and have begun to understand the dependence of the young on the more mature, and when the gardening time comes, they themselves have opportunity to become the nurturers.

As in other phases of kindergarten work, the actual experience comes forth. Before the planting begins, seeds of various kinds have been played with and their size and shape noted, and been arranged in rows and spaces. Large gardens of the neighborhood have been visited and plowing observed. Back in the fall they have put crocus bulbs "to bed" for their long winter sleep and have referred to them as the leaves have come down, and later through the cold and ice and snow of the winter, and watched for the awakening in the spring.

They have taken care of, and observed the growth of Chinese lilies in water, and have soaked large beans and planted them indoors.

Having prepared the soil, they are ready for planting. Radishes have been chosen, first because they are most likely to mature before school closes in June, and because many can be planted in small space and are attractive to children when grown. This is all that is attempted, except the beans transplanted from indoors, and a pansy plant placed in the middle of each garden gives the floral side.

When the children have placed the seeds in the ground the most delightful part begins, for then the watering must be attended to, and each child has a watering can holding a quart. It becomes necessary to call attention to the fact that we do not drink all the time, and they are led to see that plants do not want to. Some gardens are in sunny places and some in more shady ones, so it is easy to see which grows best. Some children are absent for a time, and what happens to gardens not cared for is very evident.

When seeds are planted indoors, they are expected up the next morning, and sometimes small fingers help them up, but they know better by the time the outdoor work comes. As each garden is the child's "very own" of course that child must take care of it, and equally of course the products of it belong exclusively to him. Pansy blossoms get picked with no stem at all, and then we learn why it is not the best way. Buds get picked before they have a chance to open, and again we learn why that is not best. The question arises as to what to do with picked blossoms, and by degrees they realize that they should be used either to make our own rooms pretty at home or school, or to give to someone to make them happy.

The weeding is the least delightful part, but grass does grow in the wrong place and must be taken out, roots and all, and the ground must be made soft around the little plants so the water can get down to the roots.

Walks are taken to note other gardens in yards and parks, and knowing by experience that their own blossoms must not be taken or their gardens injured by others, they have no desire to destroy other's property. "Is it ours?" is a very frequent question when we would gather something very attractive or walk in the wrong place. Having a little garden of their own helps not only to the appreciation of the rights of others, but also to an enjoyment of gardens which belong to others without touching or holding.

Simultaneously with the actual gardening out-of-doors, songs and plays about it are happening indoors. Children roll themselves up as small as possible on the floor and play they are seeds asleep down in the ground, and then as the sun and rain come to help, they wake up and gradually grow and grow, and are watered and picked for some definite purpose.

All this happens through the spring term and less than fifteen minutes a day are used for it, and although the products have no money value, it seems wholly worth while from an educational viewpoint.

While conditions are most favorable at Cherry Street, gardening is a part of kindergartening everywhere, and is carried on to some extent either outdoors or indoors, as conditions permit.

## NEWPORT.

### BY MISS GRACE B. BRAZIER.

In 1906, the educational department of the civic league started the first school garden at Newport.

Permission was obtained from the school department to use a part of the girls' playground at Lenthal School. The school department met the expense of preparing the ground: plowing, harrowing, fertilizing. The Civic League provided rakes, hoes, garden line, watering cans, seeds, and a manager.

In grades V, VI, VII, the teachers asked for volunteers and considerably more than one hundred responded. As only one hundred and six could be accommodated, the names of the others were placed on a waiting list.

Under the direction of Miss Grace Brazier, a teacher in the Lenthal School, work was begun on Arbor Day, May 11. Pupils from grades V, VI, VII attended the garden at different periods to rake over the soil and pick out the stones, working morning and afternoon. At another time the paths were marked off, and each pupil staked out for himself a plot ten feet long, three feet wide, thus learning a lesson in practical mathematics. The whole garden was eighty feet long, sixty feet wide. The boys had vegetable gardens and planted lettuce, radishes, beans, parsley, tomatoes. The girls had flower gardens.

In the early summer, prizes in the form of young plants were awarded to those who sent in the best compositions on their gardens. Not only did the gardens furnish material for language work, but also for arithmetic and drawing.

Before school closed the pupils worked in the garden before and after school. During the summer the garden was open three times a week for two hours and a half.

Prizes in the form of books were offered by Mrs. Harold Brown for the gardens that showed the best care. The books were "Nature's Garden," "How to Make a Garden," "Practical Gardening."

The next year, 1907, another garden was started at Thayer School. Thirty children were assigned gardens. Owing to the poor condition of the soils the crops did not flourish satisfactorily. This garden was discontinued the following year, and another was started at Cranston School. This was a great success. Forty children were given gardens. Each child bought his own trowel and his own weeder. The League provided other tools. Here, the gardens were ten by four feet. The children had their choice of a garden, either vegetable or flower. Only ten chose flowers. These children worked after school and Saturday mornings all through the summer.

In the spring of 1909, the children of Calvert School were provided with gardens through the generosity of Captain Garnett, a public-spirited citizen of Newport, who loaned a lot in the rear of Calvert School. Forty-nine children had gardens here. Thirty-two had vegetables. In the planning and laying out of this garden,

PLATE XIII.

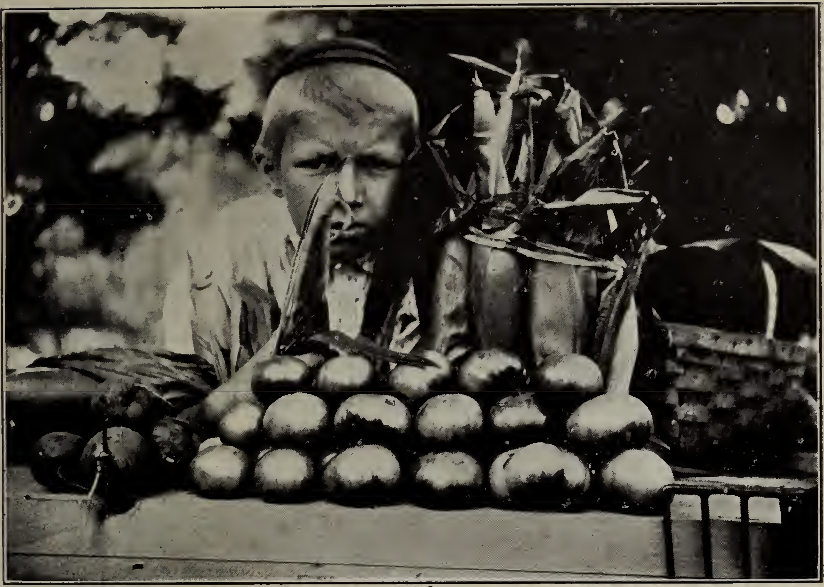

Fig. 1.—Prize Exhibit of Vegetables.

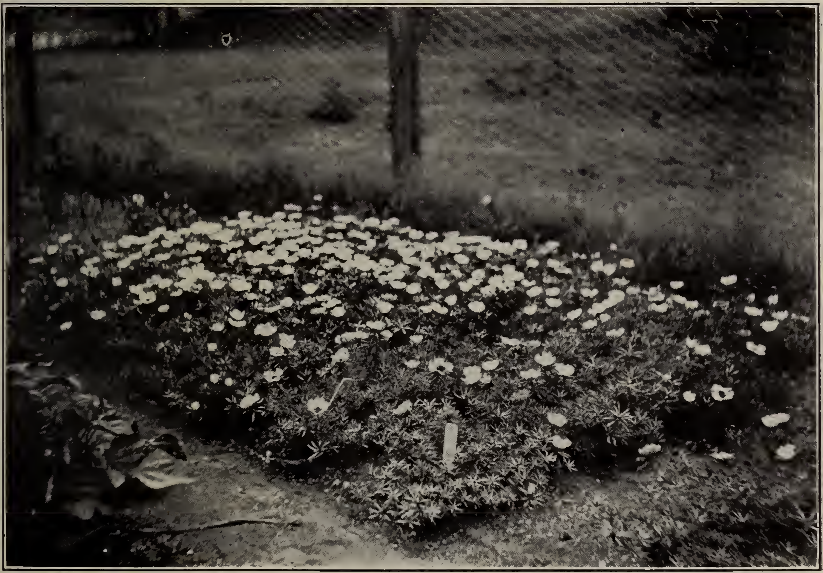

Fig. 2.—Bed of Portulacca.

much material aid and helpful advice were given by Mr. Ernest K. Thomas, who was sent by the State College to assist.

This year, 1910, a garden was started at Coggeshall School, where thirty-five children had gardens. These gardens were eight by four feet. For two years the pupils had been clamoring for gardens, but owing to the lack of funds, the league had been unable to do anything for them.

The League had been very fortunate in the gifts it has received; from the State Board of Agriculture twenty-five dollars has been sent for two years. The school department has each spring met the expense of preparing the ground in all the gardens, and has had placed on the outside of the buildings, taps by which water could easily be obtained.

The Newport Horticultural Society has each spring sent a large amount of seed and seedling plants. Mrs. Lorillard Spencer, through this Society, offered prizes each year for the three best vegetables and the three best flower gardens. These were cash prizes of $4.00, $2.00 and $1.00. Last year, Mrs. Harold Brown presented two beautiful pictures to those whose attendance had been the best. Mrs. John Nicholas Brown and Mrs. Harford Powel, who have been indefatigable workers in the gardens, have given shrubs, vines, and plants. One year Mrs. Powel gave bulbs as prizes. These were planted for spring blooming.

The league has now four school gardens that have been a success.

The influence of the gardens has made itself felt. Many children had no home gardens when the school gardens were started. This year *fifty-four* per cent. have home gardens. Several have stated their intention of giving up the school garden and devoting all their time to their home garden. Prizes were offered by the Horticultural Society for the three best home gardens, and two of the prizes, the first and second, were won by two boys who had school gardens at Coggeshall.

The ethical influence is also noticeable. One boy, a ne'er-do-well in school, had a very attractive garden which he had laid out with great care and accuracy and attended to it very faithfully. His teacher was surprised, for his work in school was careless. A marked improvement in his conduct and in his work was shown. Children who had the reputation of being not trustworthy in school never encroached upon another's property or disturbed anything in the gardens. They loved their own little plot, so felt kindly toward all others and respected the rights of the owners.

The parents of many have expressed their thanks and their appreciation of the privilege which their children have. They are so happy to know they are off the streets for a few hours, especially throughout the long summer vacation. One mother often came and worked with her child.

The school garden work is not a part of the school curriculum and what correlated work has been done, has been optional with the teacher.

The league hopes to increase the number of school gardens, but the expense of running them is great. We hope the day is not far distant when the school department will take the work up.

## WOONSOCKET.

(THE FOLLOWING REPORT IS TAKEN FROM THE REPORT OF THE SUPERINTENDENT OF SCHOOLS FOR 1910.)

A commendable effort had been made during the last few years by some of the schools to make their yards more beautiful and attractive. Flowers and shrubs adorn the approach to the building, and greensward covers what was formerly a bare and unsightly enclosure. The teachers and pupils take pleasure in the improved appearance of their surroundings, and we may feel sure that the interest thus aroused will be felt in the home and help in no small measure in making what is so much needed, a more beautiful city of Woonsocket. The Teachers' Association has done a most excellent thing in placing in every school room in the city a few good pictures; it remains for us to see that the outside environment is equally attractive. The educational value of all these things is not to be underestimated, when we consider how few of them come into the lives of many of our pupils. Most of our school yards are small and it has not seemed practicable, so far, to have the children take an active part in laying out the beds and planting seeds, but they can be encouraged to have garden plots at home, and this has been done the past two years with excellent success by the pupils of the Andrews Street School. The following interesting letter from Miss Bertha A. Hamlett, a teacher of that school, shows what has been done:

"I am sure you will be glad to know that the pupils of grades 5 and 6 at Andrews Street are becoming intensely interested in home gardening—one little boy having reported that he gets up at half past five to watch his garden grow.

"For two years the children of this room have purchased seeds. Both flower and garden seeds, in generous quantities, could be had for a penny per package—the only stipulation being that those who bought seeds should write at least one letter telling about their gardens and asking any questions.

"After the gardens were well started last year, these letters were written to the dealer, and a very prompt recognition of their efforts was made, for each child who wrote received a little letter of his own.

"The kindly consideration on the part of the dealer caused him and his whole establishment to be taken close to the hearts of the pupils. They feel that they have a friend at court and are anxious to send good reports to headquarters.

"Every question was cheerfully answered—how to prepare the ground, how to keep and when to plant certain seeds, how often to water, etc. This correspondence alone has done the children much good.

"A set of photographs taken last summer showed a goodly mass of blossoms and a number of well weeded and well kept little gardens. This is on a small scale thus far, but a start has been made, and we hope we are laying a good foundation for future interest in the home yards, and in the city as well, by those who will soon be the men and women of the community. Gardening may be a side issue in education, but if it does no more than develop the boys and girls physically and create in them a love for the beautiful in nature, is it not worth while?"

The pupils in the seventh and eighth grades are equally interested in home gardening, and I have received several interesting letters telling me what has been done. Some planted vegetables, some flowers; they had varying degrees of success, but all had accomplished something and learned valuable lessons. I would like to give all these letters to the public; they are all good, but perhaps the following will represent pretty well the attitude of the pupils in the Andrews Street School towards home gardening:

"ANDREWS STREET,
"WOONSOCKET, R. I., June 21, 1910.

"MR. MCFEE:

"DEAR SIR:—My garden is doing well, although I planted it a little later than usual. I am glad that you are interested in our gardens. I am sure that I like Mr. Vick's seeds as well as any others.

"Last year I had fine luck with his seeds, and this year I am having better luck than ever.

"My climbing nasturtiums are doing better than last year.

"I planted my garden with the highest flowers in the back and the lowest in front. In this way I can see all of them.

"I have made a path running along one side of my garden, and another through the center from side to side. By doing this I can get near to any flowers that I wish to.

"Last year I had my name made of flowers and it could be seen plainly when they first came up, but soon they got so thick that it was not very plain. So this year I did not try it.

"I hope that you will like the letters that we are writing to you.

"Yours truly,
"AVER B. DAVIS."

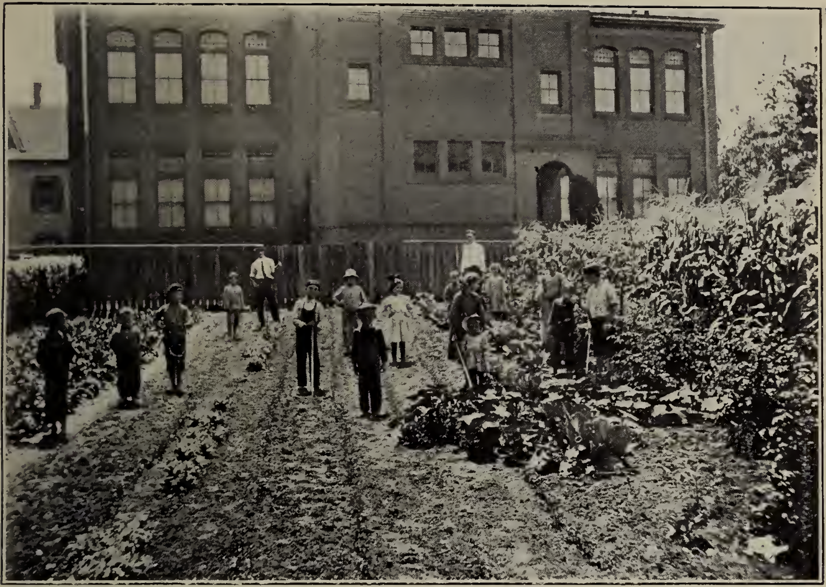

FIG. 1.—Cherry Street School Garden, Pawtucket, R. I.

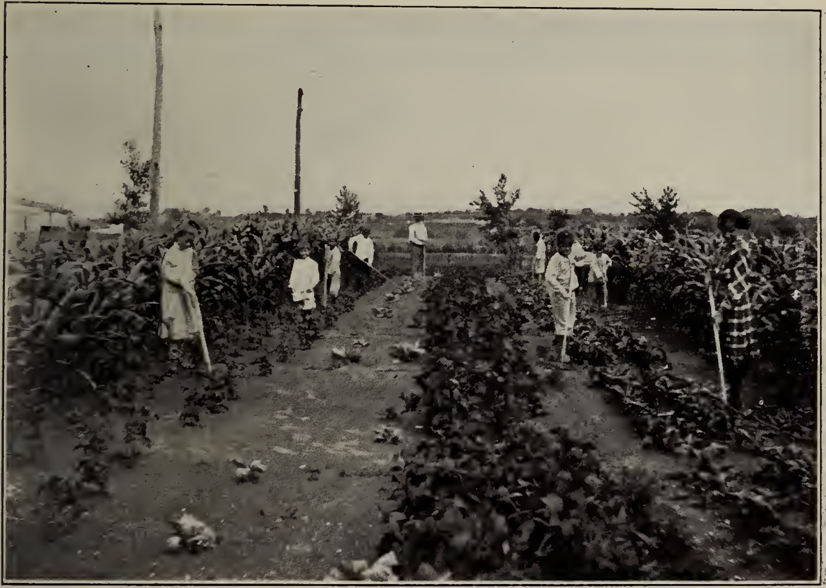

FIG. 2.—Old Warwick School Garden, Warwick, R. I.

## ST. MARY'S ORPHANAGE, EAST PROVIDENCE.

BY ELIZABETH JENNINGS, MATRON.

Our gardens were first thought of and started in 1904. The late Mrs. A. Livingston Mason of Newport, one of our managers, first conceived the thought and, as our grounds are quite large and spacious, she wished a portion to be made into a garden to be called the children's garden, and to be worked and cared for by them. At her expense they were put in order and everything needful furnished for use. Our janitor, Mr. Anderson, had the oversight and saw that everything was properly done and helped in the work himself. The first year was not very productive, either in labor or results, the ground being very stony and not having been used before it was not at that time very desirable. The children, knowing nothing about the work, as it is entirely new, did not take hold of it very readily, but when the products, which they had not been able to secure before, were gathered for their tables, radishes, green peas, beans, corn, tomatoes and cucumbers, they seemed to feel that it was worth while to have a garden and put the labor into it, since it gave them so many good things. Many of these vegetables we could not buy as the market prices were too high.

In 1905, the results were better, as the children were more willing to work for the good things to be obtained, and we had much better success. That year we were even able to have green tomatoes for pickles.

Each year up to 1911, the gardens have been worked and the results have been not only good from what they have received from them, but also in giving the children an education in that line. It has resulted in teaching the children habits of some birds, especially those which eat freshly planted seeds.

This year Mrs. Harold Brown of Newport, one of our managers, was very anxious for the children to have individual gardens, as the time had come when they really showed sufficient interest for each boy and girl to care for a little plot. Mrs. Brown had the gardens put in order, giving each child a plot about 10 by 10 feet. They were furnished with rakes, hoes, weeders, spades, and watering pots such as are used by children in the public schools. They take great interest in caring for their gardens, and children may be seen hoeing their plots without anyone telling them to do so. The girls are raising flowers; they too are working intelligently and have learned a great deal about the varieties and care of plants. They are working for first and second prizes, for the boys and girls, to be given by Mrs. Brown at the end of the season.

We are most grateful for the help given us by Mr. Ernest K. Thomas of the Rhode Island State College, thus putting our gardens in the same rank as those of the public schools. Under his guidance the children will be able to go on learning more and more, and next year I shall try the plan of buying vegetables and fruit from them for small sums of money, teaching them to keep their own accounts. The children are all working hard and anticipating the time when Mr. Thomas will decide on the four gardens to receive prizes.

Any of our friends who read this report we shall be glad to see and the children will be glad to tell them about their gardens and what they have learned.

## WARWICK.

BY C. E. WEST.

The old Warwick School has an attendance of about 175 pupils of all grades. Some of them live two miles away and few live nearer than one-half mile. It is a country school, although there are few farmers in the neighborhood. The school yard contains about two acres. Of this, only a small plot directly in front of the school-house was used for the garden. The land is level, but sandy. It has been the site of previous schoolhouses and other buildings for generations, Bricks, stone, coal—almost in paying quantities—ashes, iron, concrete and such, lay at the surface slightly obscured by a scanty growth of grass.

In the beginning, the entire lot with buildings was measured and plans drawn to scale by the pupils of the eighth and ninth grades. This was a very practical lesson. We were fortunate enough to secure the advice and assistance of Mr. E. K. Thomas, from the State College, and the garden was carried through under his direction. The garden also was planned and drawn to scale before any plowing was done. It was something over 120 feet square, divided into plots 10 x 20 feet, with walks 2 feet wide between. We planned to have a border of flowers around the whole, but this was not carried out completely.

Four barrels of lime and 500 pounds of commercial fertilizer were furnished by the State Board of Agriculture. There was used also a cord and a half of stable dressing. This and the plowing and harrowing were paid for from the proceeds of an entertainment.

Plots were assigned to thirty children, and were planted by them to corn, lettuce, radishes, peas, beets, beans, and carrots. The lettuce, radishes and peas were replaced on maturing by tomatoes, cabbages, and turnips. Each child worked his own plot.

Twenty plots were unfit to plant with the rest. Everyone turned to on these, carrying away undesirable material and bringing loam. When they were ready they were planted, some with corn and a few with peas.

It was not considered advisable to offer prizes because some plots seemed so much better than others, but some of the plots of which least was expected turned out the best. All did so well, however, that some surprise was expressed at the results. The season was an unfavorable one, nevertheless the garden throve. It was an object lesson in cultivation and fertilization.

From a school garden the same results are to be expected as from any garden, namely, the vegetables and flowers. These are good, but their value is little compared with the other things which the child gets who owns the garden. The doing things with his own hands, or, in other words, manual training and that of the most healthful kind is one. Another is respect for the property of others.

He who has something to lose thinks twice before trespassing. Everyone's garden is safer where there is a school garden. The knowledge of nature which a child gets is another thing; nothing between four walls can take its place. The more interests a child is brought into touch with, the better able he is to choose a career suited to his ability and inclination. The city would be less crowded if more of its children knew what cultivating the soil means.

## SAYLESVILLE.

BY E. L. ADAMS.

The Saylesville Boys' Club has carried on nineteen gardens the past season. Each garden was 21 x 10 feet. A large variety of seeds was planted and good results were obtained. The land was donated and plowed ready for planting by the Sayles Bleacheries Co.

The boys had many discouraging things with which to contend. The land selected was near a path leading to grounds used for sports, and those passing through were not careful to keep out of the gardens. The long period of dry weather without facilities for watering the plants, and the fact that the boys were away on long vacations or at work, made the labor of keeping the ground in good condition for growth difficult.

Mr. Thomas came out to see us several times and rendered much needed assistance in laying out the grounds and getting the work started.

Many of the boys took what they raised, and some of it was not gathered at the right time, as everybody was away, so that no accurate account was kept of the value of the product. The material purchased cost each boy about fifty-seven cents, and one boy sold from his garden products that amounted to $1.25, besides much that he carried home.

I think the best lesson for the boys was that much labor and constant care are as necessary for success in gardening as in other things.

PLATE XV.

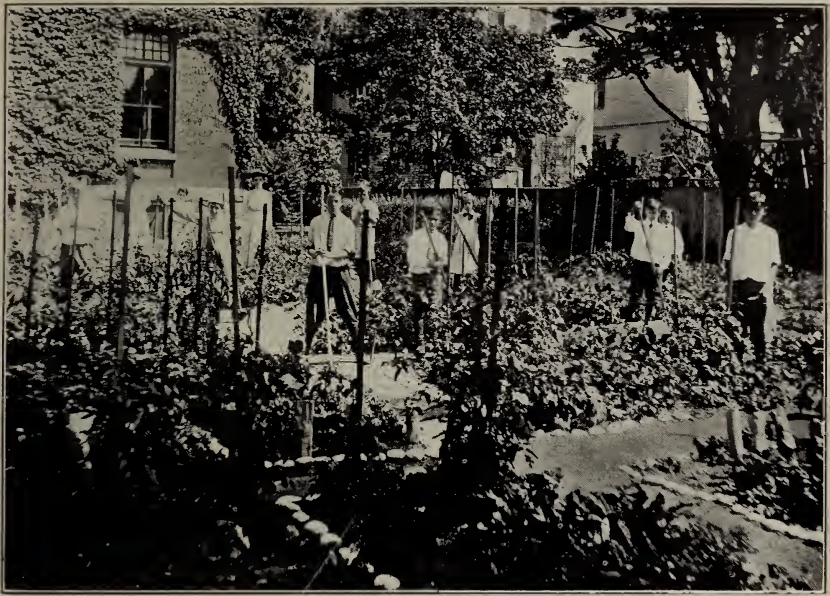

Fig. 1.—Cranston Street School Garden, Newport, R. I.

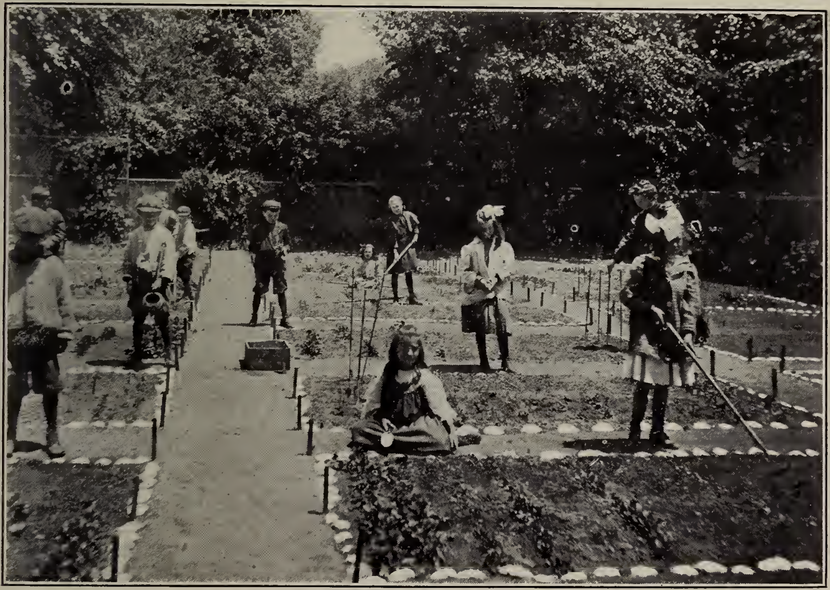

Fig. 2.—Lenthal Street School Garden, Newport, R. I.

## LONSDALE.

BY ERNEST K. THOMAS.

Just as this report was prepared for printing the school garden movement was inaugurated in Lonsdale through the cooperation of the school authorities, the Lonsdale Company, Miss Ida Bartlett, Miss Alice Hunt, and Rev. and Mrs. A. M. Hilliker.

The Lonsdale Company generously donated an excellent piece of land, and have given their assistance in many other ways, making it possible to get things started much more favorably than could have been done otherwise.

The garden contains 60 individual plots, each 10 x 20 feet in size. Many of the annuals have been planted in a border on two sides of the plot.

Children attend twice a week from the Lonsdale Grammar and Prospect Hill Schools of Lincoln, and the Minerva Avenue and Clark Street Schools of Cumberland. They are very enthusiastic over having a garden all their own, and excellent results are expected.

# HOME GARDENS.

BY ERNEST K. THOMAS.

"Spacious and fair is the world; yet oh! how I thank the kind heavens
That I a garden possess, small though it be, yet mine own.
One which enticeth me homewards; why should a gardener wander?
Honor and pleasure he finds, when to his garden he looks."
—*Goethe.*

"It is of the utmost importance that children should acquire the habit of cultivating a plot of ground long before the school life begins. Nowhere as in the vegetable world can his action be so clearly traced by him, entering in as a link on the chain of cause and effect."
—*Froebel.*

"Give a child large interests and give them young."
—*Alice Freeman Palmer.*

Wherever school gardens have been in operation for a few years one would naturally expect to find some expression of the knowledge and love of plants in the homes of the pupils. Home gardens are a natural sequence, and children should be encouraged to apply at home what they have learned in the school garden, on a somewhat larger scale if possible.

Many city dwellers have back yards which may be spaded up and enough fresh vegetables raised to supply the home table for the greater part of the summer, and in some cases where there is a good sized plot, a supply may be secured for winter use.

In any case, there is no home however humble, nor any situation so congested but what it may be improved by the introduction of plants. Vines may be planted to climb up over the doorways and windows; narrow borders may be made along side of the dwelling and flowering and ornamental plants started. If there is no place for these improvements, then there are a number of plants that grow and flower luxuriantly in window boxes, and it is surprising what a difference a few window boxes will make in a neighborhood where formerly there was nothing beautiful to attract the attention.

"In the slums of Philadelphia I have found that in the houses where there are flowers—a result of our school gardens—there is neat cleanliness, although all around is squalor."

—*Edward Martin, Philadelphia.*

"School gardens in the slums of a number of cities have taught more civic righteousness than all the police courts or college settlements have been able to do."—"*Philadelphia School Gardens.*"

It is a most distressing sight to walk through congested tenement districts in cities and mill villages in Rhode Island and see parents resting on the doorsteps and children playing in the treeless streets and gutters.

The silent influences of green plants and beautiful surroundings cannot be overestimated. Their influence will be felt later in life, although the children are unconscious of any impression. This is one of the most profitable fields for the labors of social workers and others interested in beautifying the ugly spots in the towns and cities of Rhode Island. Some notable work has already been done in a few places.

The Pocasset Worsted Company, Thornton, Rhode Island, has encouraged home gardening for about eight years. Each year the management of the mill awards prizes for the best yards. There are awards for property occupied by the overseers, and others for the mill operatives. The prize fund is in charge of a committee appointed by the contestants, who also appoint a committee to formulate a method by which the yards shall be judged. The judges are selected by the contestants, and the company is represented by two of its officers. The results have been very satisfactory, and from 65 to 75 per cent. of the houses are annually enrolled in the contest.

In nearly every yard will be found flower gardens, vines clinging to front and rear fences, and everything which would mar the appearance of the property is instantly removed. This plan has resulted in the development of one of the prettiest mill settlements in New England.

The mill village of Lonsdale offers excellent opportunity for similar work. Through the cooperation of the Lonsdale Company, Miss Ida Bartlett, Miss Alice Hunt, and the Rev. and Mrs. A. M. Hilliker, efforts are being made to interest the mill operatives in the improvement of their homes. The company will furnish loam and fertilizer to all who apply to their superintendent, Mr. Stewart, for it. Prizes are to be awarded in September for the best improvement of the home grounds.

The Wanskuck Company, Oakland, have also started a similar movement.

In many cases, parents of the children who have had school gardens have been impressed by the quantity of fresh vegetables brought home from the gardens, and have spaded up their back yards, which were formerly considered too small for such purposes. By teaching the pupils in the school garden intensive methods of cultivation, the possibilities of a small piece of land have been brought home to the parents, with the result that they have encouraged their children to apply at home what they have learned in the school garden, thus bringing the school and the home into closer relationship, as well as affording considerable pleasure and profit to all concerned.

When parents see the immediate application of a school study they approve of it. One case is worthy of special mention. Howard O'Connell, a Providence young man attending the Vineyard Street Grammar School, also the Roger Williams Park School garden, became so much interested in the work that his parents allowed him the whole yard in which to pursue his favorite hobby. Young O'Connell obtained excellent results, and his home garden was entered in a national contest conducted by the Garden Magazine. He secured the first prize and is firmly convinced that he has found his vocation in life. He is anxious to go through high school and take a course in agriculture at the State College.

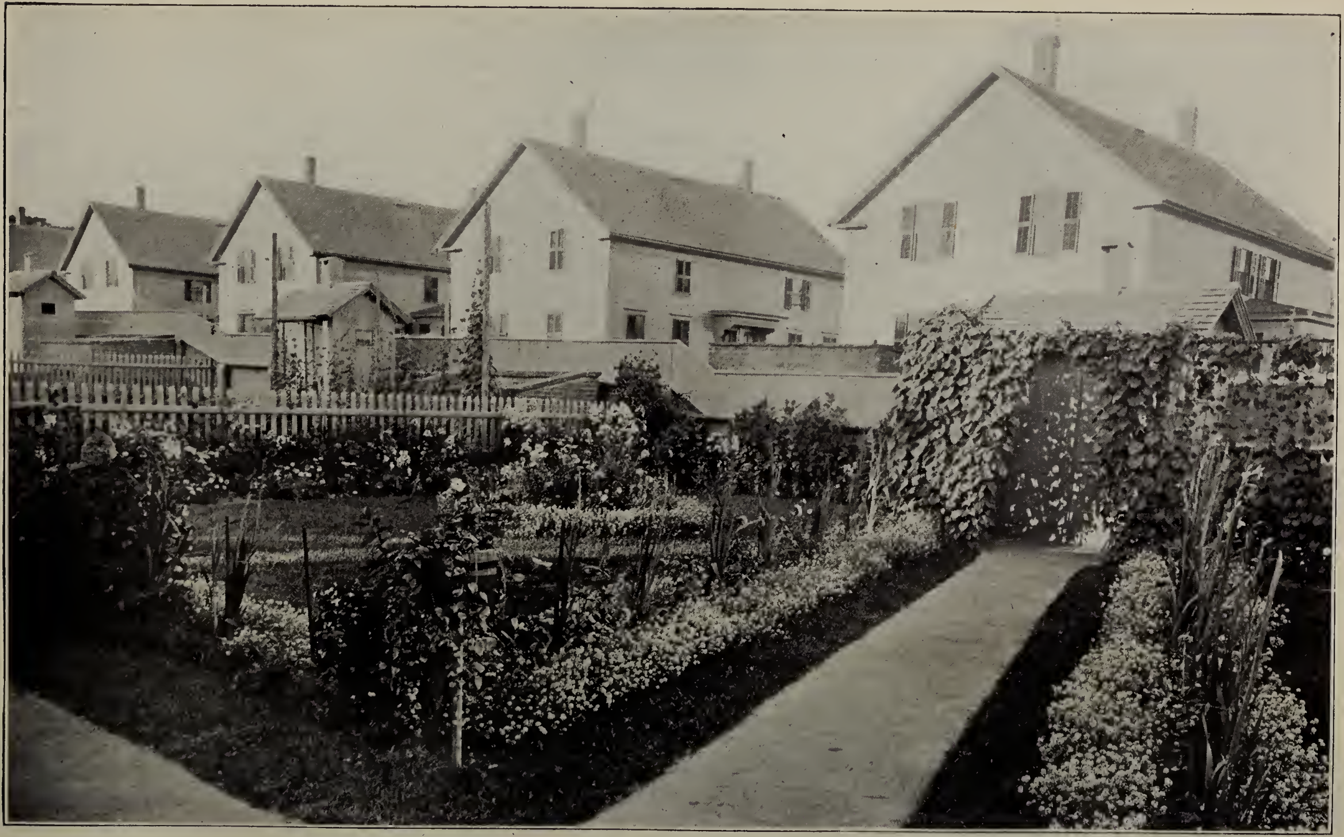

PLATE XVI.—Prize home garden of a mill operative. Pocasset Worsted Company, Thornton, R. I.

It is a significant fact that only about 2 per cent. of the pupils entering the elementary schools ever enter college. Many, of course, never have the opportunity. There are, however, a great number who could continue their studies through a college course if they had any desire to do so. The question why so many young people have no desire to study beyond the grammar grades, or even beyond the age at which they are compelled to attend school, which is usually fourteen years, the writer is not prepared to answer, but the following questions present themselves: Is the educational system at fault? Are the school and surroundings attractive to the pupils? Do they have any opportunity of testing the value of the knowledge they possess, or of realizing the need for more?

If a study in the elementary schools will so change the attitude of a boy towards the school and home, and create in him a desire for further study, and give him thus early in life some fundamental principles which underlie his life's work, then no stronger plea is needed for the introduction of that study in the public school curricula.

"Blessed is he who has found his work; let him ask no other blessedness."

"The best education in rural schools should make the people like rural life and also enable them to make it more profitable. The best way to make any workman like his work is to make him understand it. The school garden is one way of making rural life more popular as well as efficient."

—*Macdonald Movement for Rural Education.*

In some cases where there is no available land near the school, the principals of grammar schools have encouraged the pupils to plant home gardens, and when school opens in September, to bring an exhibition to the school of whatever they have mature at the time. Small cash prizes are awarded, and some excellent products are staged. In Providence, Mr. Martin S. Fanning, Oxford Street; Mr. William S. Steere, Webster Avenue; Mr. Victor Frazee, Veazie Street; and Miss Mary L. Brown, Normal school, are leaders in this matter.

"The United States is still an agricultural country, but the school system has become entirely industrialized. Agriculture is the backbone of industry and the background of the home. It manifests itself in landscape architecture and in the small home garden; it carries with it a touch of nature and lends beauty to the fields and factories and workshops when properly used; it adds to the family income when applied to the backyard vegetable garden and stimulates a wholesome home atmosphere and civic pride when applied to the home and the street and the parks. Used as an educational guide it brings the child in close touch with nature, gives him a knowledge of the secrets of the earth and stimulates thinking along lines that are eminently utilitarian, yet does not force the material to the foreground without giving due weight to personal, persistent, systematic and thoughtful effort. Agricultural education in the public schools should be made an integral part of the curriculum, even at the sacrifice of the many useless and often uncertain dates of history, complicated mathematical problems, and the study concerning the riches of countries about which we know little and care less, which we have become accustomed to accept as necessary evils of public school training."

CAROL ARONOVICI,

*Bureau of Social Research,*
55 *Eddy Street, Providence, R. I.*

# HOW TO MAKE A SCHOOL GARDEN.

BY ERNEST K. THOMAS.

The school garden should be as near the school as possible. If there is room in the school yard, that is the best place for it. It may not be possible for all the pupils in a school to take part in the work, and in that case, the garden will be an object lesson to the whole school. Much time will be lost to the teachers and pupils if the garden is some distance from the school. In some places, there may be danger of the crops being stolen, but if the garden is near the school, it will be recognized as a part of the school property, and the children themselves will see that it is not disturbed when they are around.

If there is no room in the school yard, or if it has been graded with gravel and ashes to make playgrounds, an effort should be made to secure a nearby vacant lot. Owners are usually willing to allow them to be used for such purposes. It improves the land and makes it more valuable.

In cities, it may be that there are no vacant lots near the school. Even this need not deprive the pupils of a garden, because much of the knowledge obtained in the large school garden may also be obtained by growing plants in window boxes and flower pots.

## SITUATION.

Ordinarily one would expect very little choice of a situation, but it may be well to state the advantages of some locations over others. Land which slopes a little to the southeast or southwest is preferable to a lot with a north or northeastern aspect, because the latter situation would be exposed to cold winds and would get less sunshine.

Crops are likely to be affected on low-lying lands by late frosts and fogs. On high lands, winds and gales may do considerable damage. A slight slope is preferable to a perfectly flat location, especially if the soil is somewhat heavy. The rain water will run away quicker, and the pupils can get out to work earlier after a heavy rain. The slope should not be too steep. Garden operations are difficult on very sloping land; and the soil may be washed down from the top by very heavy rains.

## SIZE OF THE GARDEN.

The size of the garden will depend upon the number of pupils, and the amount of land available. Care should be taken not to make the garden too big. Remember that in the school garden many ethical and civic lessons should be taught, and that growing vegetables and flowers are by no means the only lessons that may be taught in the school garden. If the garden is too big, the amount of work to be done will discourage the pupils. If the necessary work is not done, the garden soon becomes untidy, and the educational value is at a minimum. Cleanliness and neatness are important lessons and should be taught in the school garden.

The school garden work should be conducted in such a way that the pupils look forward to it as a pleasurable study. The garden should be of such a size that will enable the pupils to do the necessary manual work without becoming physically tired. It is impossible to teach any lesson that requires mental activity, if the pupils are tired from working in their gardens.

The following sizes for individual gardens have been found satisfactory for the pupils in the different grades:

Grades I, II, III, 5 x 10 feet; IV, V, VI, 10 x 15 feet; VII, VIII, IX, 10 x 20 feet.

The pupils in the first grade, and possibly in the second, should be doubled up; that is, two pupils should work on one plot (the two-pupil plot system).

It is not absolutely necessary for the higher grades to have plots

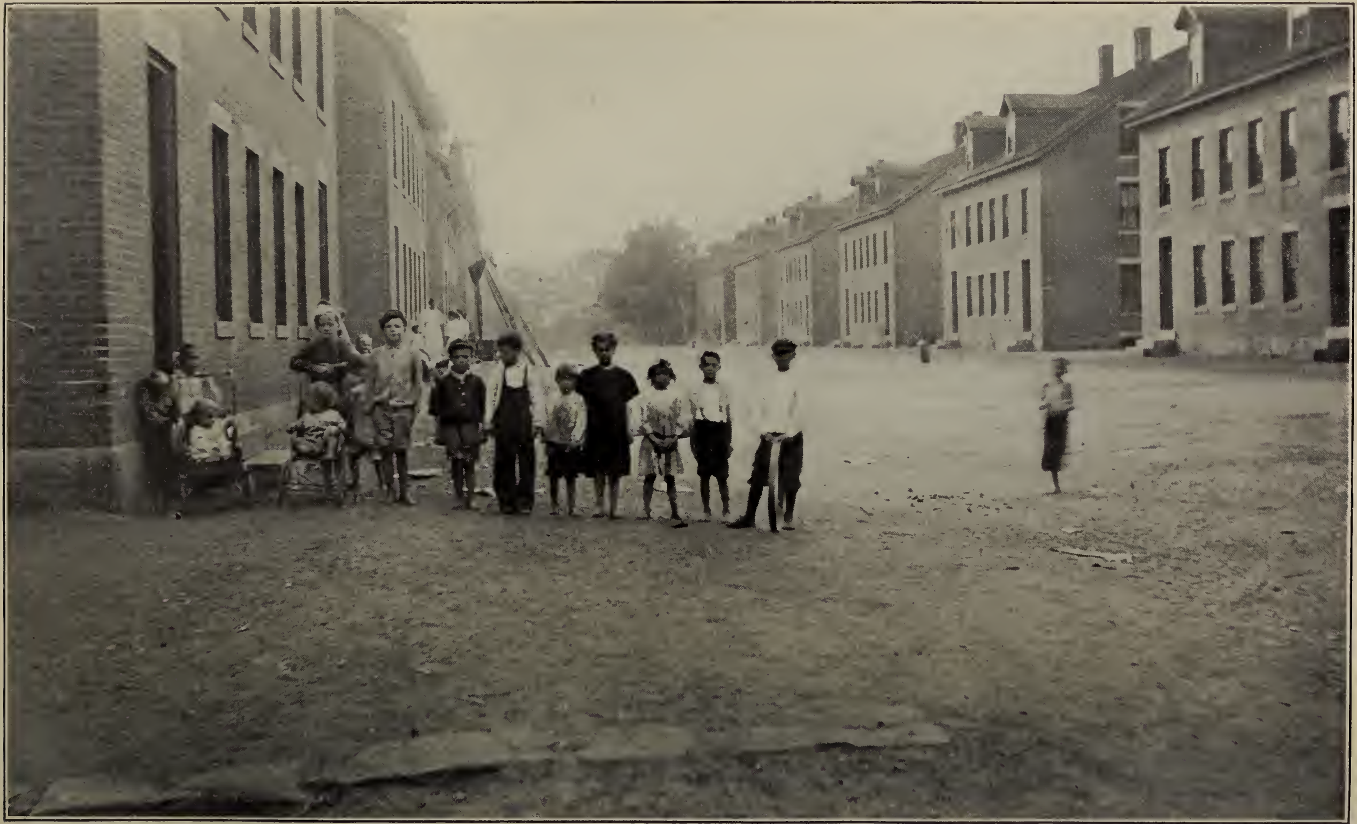

PLATE XVII.—These children need gardens. Village street, Lonsdale, R. I. A condition which will rapidly disappear as a result of the garden movement started there this year.

10 x 15 feet, and 10 x 20 feet. All of the lessons taught in gardens of this size may be taught in the smaller size of 5 x 10 feet. The only difference would be the smaller amount of vegetables and flowers which the pupils could raise, and take home.

### Preparation of the Soil.

When the size of the garden is decided upon, the next step will be the preparation of the soil. It is usually necessary to enrich the soil by adding to it materials which will help to supply the plants with the necessary plant food. Barnyard manure is one of the best fertilizers. It contains all the food the plants are likely to need. It may be obtained from nearby stables at a small cost, and often for nothing. In cities, the department of public works may be induced to supply street sweepings, although if the streets have been oiled, it may be best not to use it, as the crude oil will kill the plants and poison the soil for some time.

Cover the soil about two inches deep with the manure. If the soil is very sandy, a heavier dressing should be put on. It will help to retain the moisture. Then plow it under, or, if the garden is a small one, the boys may be able to spade it up. If the land is in sod, a disk harrow should be run over it several times in both directions after plowing. After the harrowing, a dressing of lime should be applied, and then the soil should be levelled off with a smoothing harrow. The garden is then ready for staking out.

### Staking Out the Garden.

*Materials.*—Garden lines; tape measure, 50 or 100 feet long; wooden mallet; a number of stakes 9 to 12 inches long and one inch square; a dozen large stakes, 18 inches long and 2 or 3 inches square; several balls of twine; hoes, rakes, spades, and wheelbarrow.

### Suggestions for Laying Out a Garden 100 Feet Square.

Begin by placing four of the strong stakes at the corners 1, 2, 3, 4, Fig. 1, and drive them down to within two inches of the ground.

Then stretch a garden line "taut" from one stake to the opposite stake on the same side, then find the center of the line by using the tape measure; mark the center by driving down another strong stake flush with the soil. Repeat this on the other three sides. The center stakes 5, 6, 7, 8, will mark the middle of the two main paths.

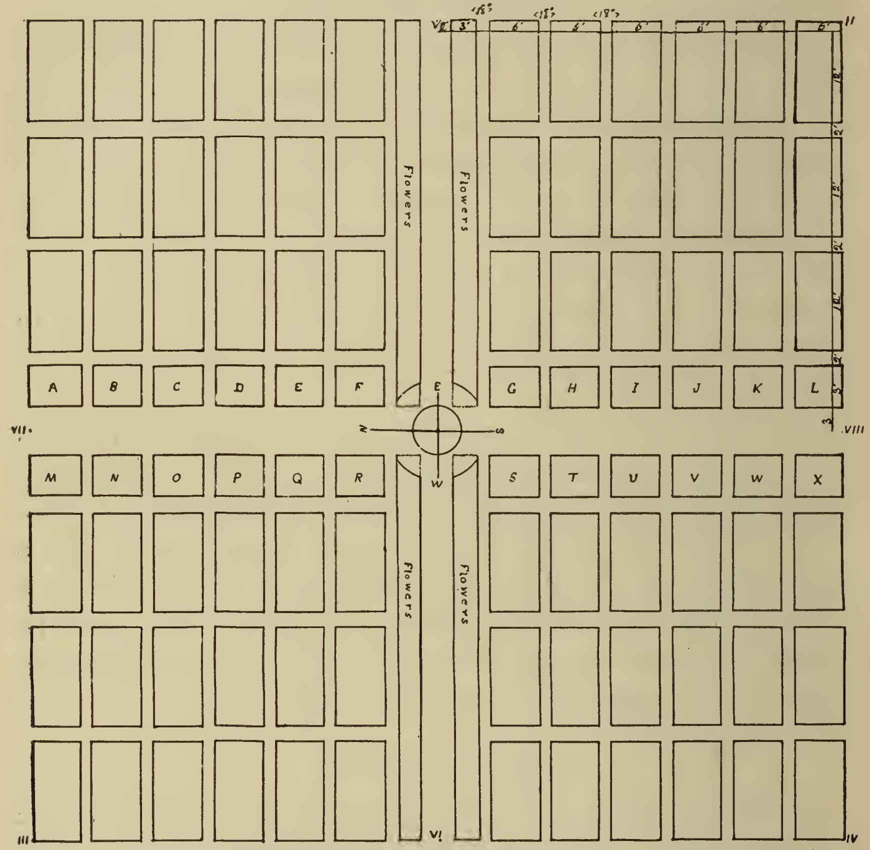

Fig. 1.

Stretch a garden line from 1 to 2. Fix the end of the tape measure at 5 and extend it along the garden line to the corner 2, and secure it. At two feet on the tape measure and close up to the garden line, drive in a small stake. This marks one side of the central path. Then at five feet on the tape measure, put in another stake. This marks the edge of a border three feet wide. Next comes a path 18 inches wide. Put in a stake at 6½ feet on the tape measure. At 12½ feet on the tape place another stake, marking off the end of a garden 6 feet wide. Continue this to the corner, and we find that the one end of six gardens are marked off, with walks dividing them 18 inches wide, and the end of a border 3 feet wide. Repeat this from 5 to 1, and from 6 to 4, and from 6 to 3.

Now stretch the garden line from 2 to 4 along the other direction. Secure the end of the tape measure at 8, then stretch it along to the corner 2 and fasten it there. At 3 feet on the tape place a stake, another at 8 feet, another at 10 feet; then at 22, 24, 36, and 38 feet, and we have the sides of three gardens marked off each 12 feet long, with paths 2 feet wide between, and the side of a border 5 feet wide for flowers. Repeat the measurements from 8 to 4, 7 to 1, and from 7 to 3, then all the stakes on the outside boundaries will be in position.

Now connect all stakes on one side with the corresponding stakes on the opposite side with twine, and you have the garden all laid out, the twine marking the paths. Place small stakes in all corners where the twine crosses; always on the garden side, not on the path side. See Fig. 2.

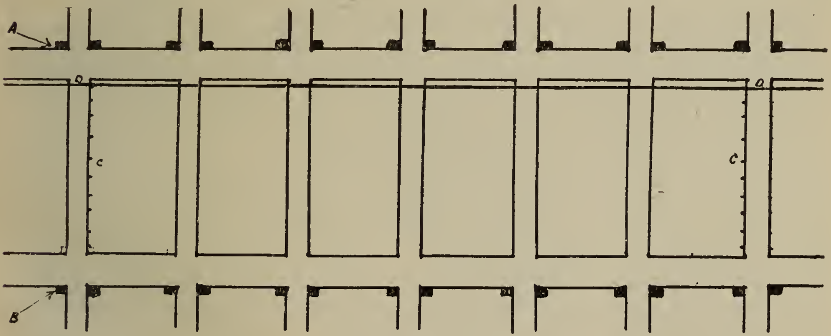

Fig. 2.—A, B, showing how to place corner stakes, on the garden side of line, not in the paths. C, sides of gardens marked with pegs, indicating position of drills. D, garden line stretched tight, between corresponding pegs on two sides.

Great care should be taken to have all measurements accurate. The garden line and the twine must always be stretched tight. If the lines are loose, it will be impossible to make straight paths. The stakes should be square, or flat on one side, and placed in the soil firmly and square in the angle formed by the crossing lines. See Fig. 2. One of the corner pegs in each plot should be numbered. The numbered peg should be placed in the same corner of each plot.

To make the center bed, find the center of the garden by stretching garden lines from 5 to 6 and from 7 to 8. Place a round stake, or the handle of a hoe or rake will do, in the ground exactly at the point where the lines cross. Now get a piece of strong twine, make a loop on one end and slip it over the stake in the center. Now roll the other end of the twine around a short stake until there is a distance of three feet between the two stakes, then inscribe a circle the radius of which will be three feet. After the circle is made with the point of the stake, use a spade and throw up the soil from around the circumference of the circle to make the bed quite distinct. Now unwind the twine on the small stake until there is a distance of 6 feet between it and the center stake, and inscribe another circle with a radius of 6 feet. Fig. 3. This will mark the walk around the center bed, and will take off a section from the center flower beds, as shown in Fig. 1.

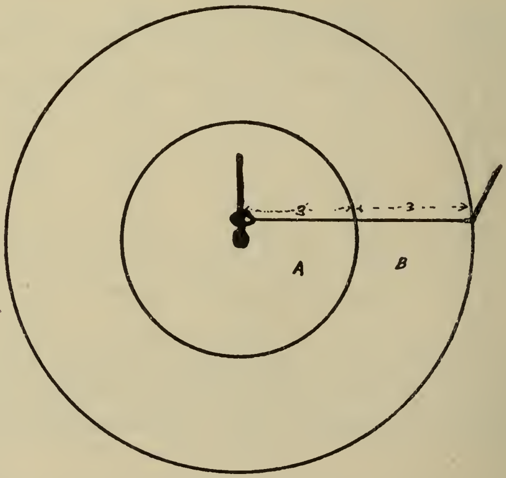

Fig. 3.—Showing how to make the center bed; A center bed, B walk.

PLATE XVIII.

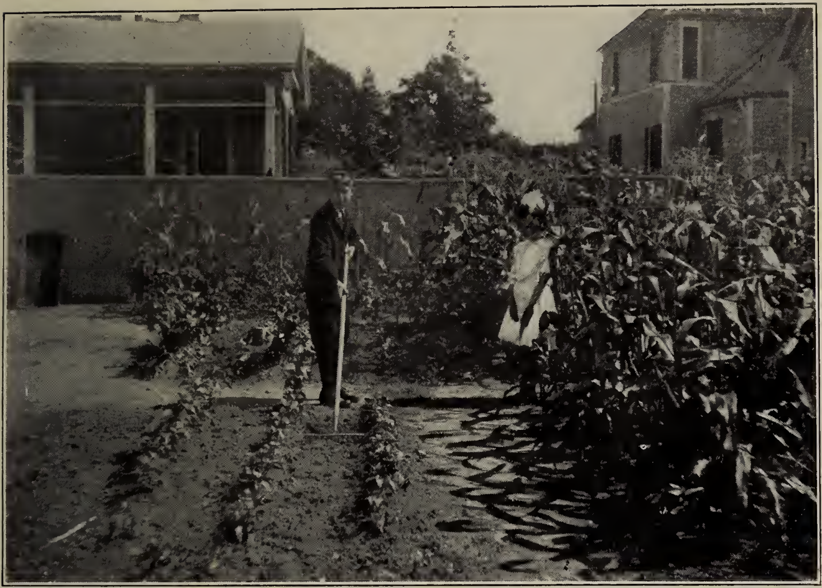

FIG. 1.—Howard O'Donnell's Home Garden. Won first prize in national contest conducted by the *Garden Magazine.*

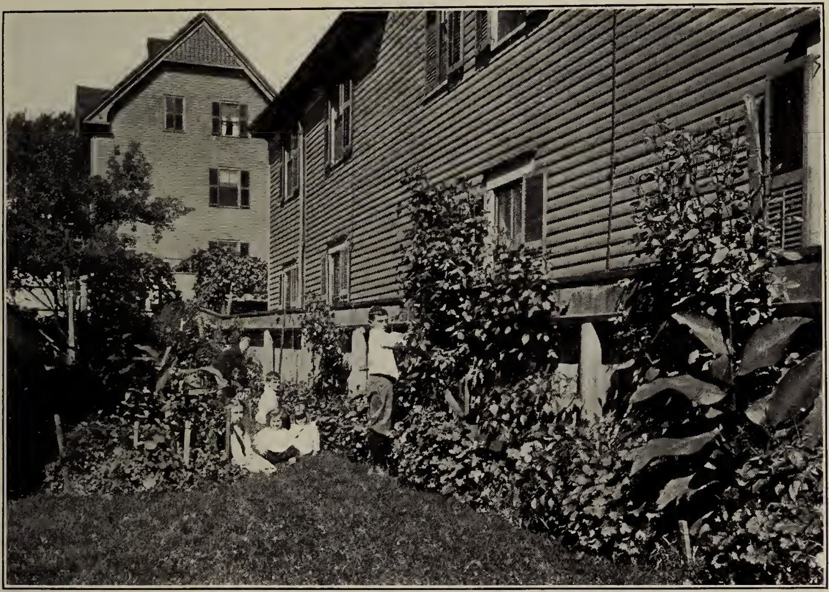

FIG. 2.—Albert Frazer's Home Garden. Showing how to beautify barren spots between tenements.

The garden now contains 72 individual plots, each 6 x 12 feet, which may be planted with vegetables; two borders three feet wide running east and west through the center, for flowers; and 24 small plots, each 5 x 6 feet, which may be used for flowers, economic plants, special crops, experiments, or a botanical garden.

When all the stakes are in, remove the twine and give each pupil a piece long enough to go around their plots about 38 feet long. Let the pupil tie the end to a corner stake, then extend it to the opposite corner stake, and wind it around once, keeping the twine tight, then on to the other two pegs, and back to the first one, where the twine should be firmly secured. It is a good plan to leave enough twine with which to tie a knot when starting from the first peg.

The pupils should do all the work under supervision. Begin early so that if mistakes are made, there will be plenty of time to have the work done over again. Insist upon accuracy in measurements just as much as in the class room. This work affords an excellent opportunity for the pupils to apply their mathematics.

## Getting Ready for Planting.

The next lesson should be the preparation of the gardens for planting. All stones and rubbish should be raked to the side of the gardens, and lifted into a wheelbarrow. Do not allow the pupils to remove fine soil, only the rough material that will not readily pulverize should be removed.

Make each garden as level as possible. The paths should not be dug out and the soil put on the gardens, making them several inches higher than the walks. If this is done, heavy rains will wash down the soil into the walks again. Keep the walks a little higher in the center than at the sides.

It is a good plan to sprinkle over the surface of each plot a little garden fertilizer a day or two before planting, and rake it in the surface soil. This will give the plants a good start.

### What to Plant.

Plants of a dwarf, compact habit of growth should be chosen. Seeds should be obtained put up in one cent packages, if possible.

The following suggestions are made for gardens of different sizes:

10'

5 in.
Tomatoes
1 ft.
Radish
1 ft.
Cabbage
1½ ft.
Beans
1½ ft.
Beans
1½ ft.
Beets
1½ ft.
Beets
1¼ ft.
Lettuce
4 in.

15'

6 in.
Tomatoes
1 ft.
Lettuce
1 ft.
Tomatoes
1 ft.
Radish
1 ft.
Cabbage
1 ft.
Peas
1 ft.
Cabbage
1 ft.
Peas
1½ ft.
Beans
1½ ft.
Beans
1½ ft.
Beets
1½ ft.
Turnips
1 ft.
Radish
6 in.

12'

6 in.
Tomatoes
1 ft.
Radish
1 ft.
Cabbage
1½ ft.
Beans
1½ ft.
Beans
1¼ ft.
Peas
1¼ ft.
Peas
1¼ ft.
Beets
1¼ ft.
Turnips
1 ft.
Lettuce
6 in.

Suggestions for planting a garden 20 feet long may be found on page 28. If it is desired to plant half the garden with flowers and half with vegetables, the following arrangement may be made, although we think that it is usually best to confine the flowers to separate beds or borders:

3 in.
Tomatoes
1 ft.
Radish

1 ft.
Beans
1½ ft.
Beets
1 ft.
Carrots
1 ft.
Lettuce
1½ ft.

| | | | | |
|---|---|---|---|---|
| Zinnias | | Cockscomb | | Asters |
| 1½ ft. | | 1½ ft. | | 1½ ft. |
| Balsam | | Balsam | | Mignonette |
| 1½ ft. | or | 1½ ft. | or | 1½ ft. |
| Phlox | | Iberis | | Pyrethrum |
| 1½ ft. | | 1½ ft. | | 1½ ft. |
| Sweet alyssum | | Portulacca | | Lobelia |
| | | 3 in. | | |

## How to Plant the Vegetable Garden.

When the gardens are ready for planting, and the arrangement of crops decided upon, the outer edge of the two outside series of gardens should be marked with pegs indicating the position of each row. See Fig. 2 c.

To plant, stretch a garden line taut along the end of all the gardens and close up to the pegs on both sides of the garden which mark the position of the first row. See Fig. 2 d. To be sure the garden line is straight, see that it is tight, then lift it up in the middle and let it fall to the ground.

Now arrange the pupils around one end garden. The class should never be any larger than enough to stand around the instructor at a distance, not too far away, but near enough to enable them to observe every movement, and not crowd.

Take the hoe and make the drill for the seed along the end of the garden, taking care to keep close to the garden line. The drill should be made the same depth, as near as possible, all along the garden. For proper depths to plant the different seeds, see page 28.

The instructor should inform the pupils what is to be planted first and point out the proper depth. Then show the pupils how to make drills of different depths, $\frac{1}{2}$, 1, 2, 3 inches. This is important because children seldom have any idea how deep an inch is, and the appearance of the garden will depend largely upon how it is planted.

Drills one-half inch and one inch may be made with the handle of the hoe. For deeper drills, the blade may be used. Teach the pupils not to pull the soil into the paths at the end of the drills. They should keep all the soil on the garden. The drills should be started from the twine on one side of the garden and continued to the twine on the other side. Without this guide, some drills may be started in the middle of the paths, and others six inches or more from the side of the garden.

Plant the first row, showing the children how to tear off the end of the package, and empty the contents in the left hand, then, if it is a large seed like corn or beans, let them plant each seed separately, placing them the right distance apart. If the seed is small, like lettuce, they should be taken up between the thumb and finger of the right hand, and by moving the fingers, dropped thinly in the drills.

Cover the seed, using the blade of the hoe; then a most important lesson should be taught, firming the soil over the seed with the hoe. If the soil is loose over the seeds, moisture will evaporate quickly from the soil, and it cannot rise through capillary attraction.

After this demonstration, let each pupil make his own drill along the line in the same way. The instructor should then pick up a bundle of seeds and walk along through the plots. When a pupil has his drill made the right depth, give him a package of seeds.

When all the gardens have been planted, the garden line should be moved down to the next peg on the two outside gardens, and fix it tight as before. For this purpose it is a good plan to have two bright boys occupy the end gardens. A mallet or piece of wood should be provided, one on each side. Let one boy drive in his end of the line close to the peg, then the other boy should pull the line as tight as possible and fix it securely in the ground.

Plant each row in the same way, all the pupils planting the same thing at the same time. This will be more satisfactory than allowing

PLATE XIX.—City back yards which might be beautified through children's school and home garden work.

each child to have a different arrangement of crops, and the general appearance of the garden will be much improved. At the same time it will facilitate supervision.

Plants of cabbages and tomatoes may be purchased. Select an early cabbage, and a dwarf variety of tomato. After all the seed is planted, the plants may be set out, using the garden line for marking the rows. Set out the plants two feet apart. A hand trowel should be used for the purpose. See that the plants are planted firmly. Plant tomatoes and the cabbage in the soil up to the first leaves. After planting, they should be watered thoroughly to settle the soil around the roots. Choose a dull day for transplanting, if possible.

### How to Plant Flower Borders.

No garden line will be needed. A flat stick the width of the border may be used for marking the position of the drills. Annuals should be selected with reference to the color, height, and space needed for development. See following table for list of annuals which may be grown.

Care should be taken not to plant the seed too deeply. Very few need to be planted more than an inch, while very fine seed, like petunia and lobelia, will never come up if planted an inch deep. The smaller the seed, the shallower it should be planted.

A few dahlia and canna roots may be planted in some of the beds; also a few plants of scarlet sage. For the center bed, a castor oil plant in the center, with cannas or scarlet sage around it, and an edging of sweet alyssum would be quite attractive all summer.

## LIST OF FLOWERS FOR BORDERS.

### Annuals.

*White Flowers.*

| *Name.* | *Average Height.* | *Distance Apart.* |
|---|---|---|
| Ageratum | 12 inches | 8 inches |
| Alyssum | 6 " to 12 inches | 6 " |
| Asters | 15 " to 24 " | 12 " |
| Dianthus | 12 " | 6 " |

*White Flowers.*

| *Name.* | *Average Height.* | *Distance Apart.* |
|---|---|---|
| Iberis | 8 inches to 12 inches | 6 inches |
| Stocks | 12 “ to 15 “ | 8 “ |
| Poppy | 24 “ | 12 “ |
| Phlox | 8 “ to 12 “ | 8 “ |
| Balsam | 12 “ to 18 “ | 18 “ |
| Verbena | 12 “ to 18 “ | 10 “ |

*Yellow Flowers.*

| | | |
|---|---|---|
| Calendula | 12 inches to 24 inches | 8 inches |
| Cacalia | 18 “ to 24 “ | 10 “ |
| Coreopsis | 24 “ to 36 “ | 10 “ |
| Eschscholtzia | 12 “ to 18 “ | 10 “ |
| Nasturtium | 8 “ to 10 “ | 6 “ |
| Zinnias | 24 “ to 30 “ | 12 “ |
| Hibiscus | 24 “ | 12 “ |
| Phlox | 8 “ to 12 “ | 8 “ |
| Celosia | 12 “ to 36 “ | 12 “ |
| Mimulus | 12 “ | 6 “ |

*Blue Flowers.*

| | | |
|---|---|---|
| Ageratum | 12 inches | 8 inches |
| Centawrea | 24 “ to 36 inches | 12 “ |
| Asters | 15 “ to 24 “ | 12 “ |
| Lobelia | 6 “ | 6 “ |

*Red Flowers.*

| | | |
|---|---|---|
| Cacalia | 18 inches to 24 inches | 8 inches |
| Clarkia | 18 “ | 8 “ |
| Dianthus | 12 “ | 6 “ |
| Gaillardia | 24 “ | 12 “ |
| Stocks | 12 “ to 15 “ | 8 “ |
| Phlox | 8 “ to 12 “ | 8 “ |
| Saponaria | 12 “ to 15 “ | 9 “ |
| Nasturtium | 8 “ to 10 “ | 6 “ |
| Verbena | 12 “ to 18 “ | 10 “ |
| Agrostema | 24 “ | 10 “ |
| Celosia | 12 “ to 24 “ | 12 “ |
| Adonis | 12 “ | 6 “ |

### ANNUALS.

| *Name.* | *Color.* | *Average Height.* | *Distance Apart.* |
|---|---|---|---|
| Balsam | Rose and white | 12 inches to 18 inches | 10 inches |
| Calendula | Deep orange | 18 " to 24 " | 8 " |
| Chrysanthemum | Yellow, red and white | 12 " to 24 " | 12 " |
| Shasta Daisy | White and yellow | 36 " | 15 " |
| Mignonette | Greenish yellow | 12 " | 6 " |
| Godetia | White and rose | 12 " | 6 " |
| Mirabalis | White, rose, red, yellow | 24 " to 36 " | 12 " |
| Nigella | Blue and white | 12 " | 6 " |
| Petunias | Many colors | 24 " | 12 " |
| Portulacca | Red, yellow, and white | 6 " | 4 " |
| Sweet peas | Mixed | 36 " to 60 " | 3 " |

### *Plants with Ornamental Foliage.*

| | | | |
|---|---|---|---|
| Amarantus | Red, yellow, green | 24 inches to 36 inches | 12 inches |
| Centaurea | Grayish | 6 " | 6 " |
| Coleus | Mixed | 12 " | 18 " |
| Euphorbia | Green and white | 24 " | 12 " |
| Perilla | Dark purple | 24 " | 12 " |
| Pyrethrum | Yellow | 6 " | 4 " |
| Ricinus | Green | 70 " to 180 " | 36 " |

### *Dwarf Plants Suitable for Edgings.*

Alyssum, Portalacca, Lobelia, Pyrethrum, Centaurea, Iberis.

## Observation Plots.

A few of the more important economic plants that can be successfully grown in the school garden should be planted. Material showing the different stages in the manufacture of the finished product from the plant should be secured from manufacturers. Such an exhibit will be of great educational value.

The following plants are of great economic importance. A brief description and instructions for growing and harvesting are given.

## Field Corn.

The chief use of field corn is as a food for domestic animals. It is also made into meal from which bread and cakes are made. They are said to be less digestible than the products of wheat flour, but are usually considered healthful articles of food for human use.

Glucose, starch, alcohol, corn starch, etc., are made from the grain. The pith of the stems is used in the manufacture of explosives, and the stems in the manufacture of paper. There are many by-products, such as oil, gum, gluten meal, etc., secured in the manufacture of the above products.

Plant in drills, three feet apart, and two inches deep, placing kernels three inches apart. Thin out the young plants to two and a half feet apart. Seed should be planted during the first and second week of May. A flint variety should be planted, as it ripens in a shorter period than dent corn, and is used extensively in the northern states on that account. Flint ears vary in length and may be 16 inches long; usually, however, they are from 7 to 12 inches.

### Sweet Corn.

Sweet corn should be planted in drills three feet apart and two inches deep. Drop the kernels three inches apart. When the plants are well up, thin out to 18 inches apart. Cut off all suckers which will not develop into good stalks.

### Popcorn.

Popcorn may be grown in just the same way as the sweet corn. It does not grow quite so tall, however, and may be grown a little thicker.

### Broom Corn.

Broom corn does not belong to the same family of plants as the field corn.

There is a dwarf and a tall variety. The latter is used for making carpet brooms, while the dwarf variety is used for making the smaller whisk brooms.

It is very susceptible to cold, wet weather, and should not be planted until the weather has settled and danger from frosts is passed. Plant just after the field corn. Plant the seeds two inches apart, in drills thirty inches apart. Growth during the early stages is very slow. Keep the soil free from weeds.

Pull up the broom corn just after the pollen has fallen. Dry the stems in the sun, and store in a well ventilated room.

### Spring Wheat.

Wheat is used almost exclusively for the production of flour from which various forms of food are made; while its by-products, bran, middlings, and shorts, serve as food for domestic animals.

Plant wheat as soon as the soil can be worked early in the spring. Plant in drills one and one-half to two inches deep, and about ten inches apart.

It is usual to cut wheat when the straw begins to turn yellow and the grains have become just hard enough not to be easily crushed with the thumb nail.

### Oats.

Oats are used chiefly as food for horses, cattle, and sheep. Oatmeal and other breakfast foods for human use are made from the grains. They are very nutritious and consumed by a large number of people.

Plant at the same time as wheat, in drills one and one-half to two inches deep, and eight to ten inches apart.

### Barley.

Barley is used chiefly as food for domestic animals and for malting purposes. The naked kernels from which the hull has been removed are used to a slight extent as a human diet and are known as "pearl barley."

Plant in the same way as wheat and oats, preferably a little later, as frost may injure the young seedlings.

### Rye.

Rye straw is very valuable. It is used extensively in the manufacture of paper and for packing purposes; also for bedding domestic animals. A flour is made from the grain which is also used in the production of alcohol. The flour is used largely as food for animals. A bread is made from the flour, but it is considered to be less nutritious than bread made from wheat flour in this country.

Rye should be planted in the same way as wheat.

### Buckwheat.

The grain of the buckwheat is made into flour from which the well-known buckwheat cakes are made. A by-product known as "buckwheat feed" is highly prized by farmers as a feed for milch cows. Bee keepers always grow this plant. The honey gathered from the flowers is always of a very fine quality.

Under favorable conditions, buckwheat will mature a crop in from ten to twelve weeks. It should not be planted, then, until about the first or second week in June. A crop of radish may be grown on the buckwheat plot first.

Plant in the same way as wheat, in drills ten inches apart, one and one-half to two inches deep.

### Flax.

Flax is grown extensively for the fibre obtained from the stems and from the oil obtained from the seed. The fibre is used in the manufacture of laces, fine linens, thread, twine, bagging, paper, etc.

Plant in drills twelve inches apart, one-half to one inch deep. Do not plant until danger from frost is over. The crop will mature in from twelve to fourteen weeks.

### Hemp.

Hemp is another plant grown for its fibre, which is made into cordage and carpets. It is also grown for its oily seed and for a kind of resin obtained from the leaves.

It requires two or three more weeks than flax in which to mature, and is not injured by slight frosts. It may, therefore, be sown earlier than the flax or oats.

Plant in drills eighteen inches apart and one inch deep.

## Botanical Garden.

A botanical garden is always interesting. The following familiar plants are arranged in the natural order, or family, to which they belong:

1.—*Natural Order or Family, Cruciferœ.*—Cabbage, cress, radish, rape, turnip, horse radish, alyssum, stocks, candytuft.

2.—*Natural Order or Family, Leguminosœ.*—Alfalfa, alsike clover, red clover, white clover, vetches, sweet peas, culinary peas, beans.

3.—*Natural Order or Family, Umbelliferœ.*—Carrot, celery, parsnip, anise, caraway, dill, fennel, parsley.

4.—*Natural Order or Family, Compositœ.*—Salsify, dandelion, endive, marigolds, calliopsis, zinnias, aster, ageratum, gaillardia, cosmos, daisy.

5.—*Natural Order or Family, Solanacœ.*—Potato, tomato, pepper, tobacco, egg plant, petunia.

6.—*Natural Order or Family, Geraniaceœ.*—Balsam, nasturtiums.

7.—*Natural Order or Family, Cucurbitacœ.*—Cucumber, squash, melon.

8.—*Natural Order or Family, Chenopodiaceœ.*—Beet, spinach.

9.—*Natural Order or Family, Euphorbiaceœ.*—Castor oil plant, painted leaf.

10.—*Natural Order or Family, Polygonaceœ.*—Buckwheat, rhubarb.

11.—*Natural Order or Family, Labiatœ.*—Basil, marjorum, lavender, sage, savory, thyme.

12.—*Natural Order or Family, Liliaceœ.*—Asparagus, onion, leek.

13.—*Natural Order or Family, Gramineœ.*—Wheat, barley, rye, oats, rice, sweet corn, sorghum, millet.

## After Planting.

When all the planting is finished give the garden a general cleaning up. Teach the principles of good road building by showing the children how to fix the paths around their gardens. They should be a little higher in the center than at the sides, so that rain will run off and not stand in puddles. It is easier to push wheelbarrows over hard, smooth paths than uneven soft ones. Such lessons will never be forgotten and later in life, when asked to act upon certain legislation affecting roads, they will be able to do so intelligently.

### Cultivation.

When the seedlings are well up, cultivation should begin. Use the hoes between every row, loosening the soil two or three inches deep. Care should be taken not to work too near the plants. Never allow any weeds to grow. For getting up close to the crops, a hand weeder will be found very useful. A loose layer of soil should be maintained over the surface of the garden all through the year. This will act as a blanket on the garden and prevent the moisture from evaporating from the soil below. After a rain, the earth will become packed, and just as soon as the soil is dry enough, the loose layer, or, "mulch," should be renewed.

### Thinning Out.

This is one of the most difficult lessons to teach in the school garden. Children dislike to pull up the seedlings. They regard it as a waste of time and money. It is false economy, however, to leave the crops without thinning. There is an excellent opportunity here to teach an important lesson in hygiene. People cannot be healthy and develop properly if they have to live in crowded tenements where several people occupy one room. Every person needs plenty of fresh air and good food if they are to develop properly. Plants need exactly the same conditions. Crops, like beets, turnips, carrots, lettuce, etc., will be practically useless if they are not thinned out.

A good way to teach this lesson is to ask the pupils to draw on the blackboard, or still better, on the soil by the side of their gardens, a circle which will represent the size of a mature beet or turnip, or whatever the crop might be. They will usually have a good idea of the size. Let them make three or four circles with a space of half an inch between. Now make a mark in the center of the circle and ask the pupil to measure the distance between the center of two circles.

That will be the amount of space that should be left between two plants. See Fig. 4.

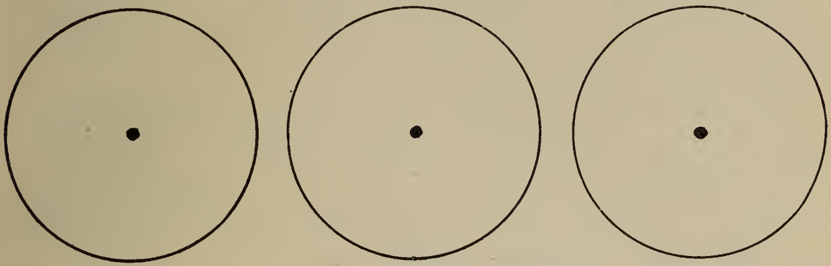

Fig. 4.—Showing how to teach pupils the necessity of thinning out such plants as beets and turnips.

Lettuce should be thinned out to three inches apart first, then when the leaves begin to touch, every other plant should be taken up and used as salad, leaving the remaining heads six inches apart. The annuals will need thinning, according to the distance apart required by the different varieties. See page 91.

### Transplanting.

Such plants as lettuce and beets may be transplanted. If there are any parts of the drill where the seeds did not germinate, they may be filled up with plants from another part where there are plenty.

Lift the plants with a hand fork or trowel, taking care not to break off the roots.

Make the soil firm over the roots when transplanting and water immediately after. A cloudy day is best for this operation. Many of the annuals may be transplanted to fill up vacant places.

### Watering.

Unless there are facilities close at hand for watering, it is not usually advisable to attempt it. To be of any good, enough water must be carried on to the gardens to saturate the soil several inches deep. If you start watering, you must keep it up all through the summer, and the warmer it gets, the more water will be needed.

It is surprising how the plants will withstand a severe drought for several weeks, if proper attention has been paid to cultivating the surface soil right from the start.

### Staking and Training Tomatoes.

Tomatoes should be staked in the school garden. Neat stakes four feet long and one inch square, painted green, can usually be bought at from three to four cents apiece.

The main stem of the tomato vine should be secured to the stake with soft twine. All side growths should be removed. It adds much to the appearance of the garden to have the tomatoes all neatly staked up. If allowed to lay on the ground, the vines will cover up some other crop, and the fruit is likely to rot.

### Harvesting the Crops.

Just as soon as a crop is mature it should be removed. It is an excellent plan to have a quart and a half-peck measure in the garden so that the pupils can measure up their products.

Many children in the public schools can recite their tables backwards and forwards, but they have no idea what a quart or a peck of anything looks like, but, when they measure their beans for instance, they know what that quantity of beans looks like, and their tables mean something to them. There should be a scales in the garden also, and such crops as cabbage and potatoes accurately weighed.

### Second Crops.

Intensive methods of cultivation should be employed. Teach how to obtain a maximum yield from a minimum area. When a crop matures, plant another one, if there is room for it. Beans, beets, and lettuce may be planted from May to August; turnips, in July; spinach and radish, in August and September.

### Keeping Diaries.

The pupils should keep diaries of every garden operation. It is a good plan to provide a cheap diary and encourage the pupils to make notes of the work done, and information gained, at the end of each lesson. The teachers should utilize this material for the spelling and language work in the school.

State of Rhode Island and Providence Plantations.

STATE BOARD OF AGRICULTURE,

JOHN J. DUNN, Secretary.

# SOME SUGGESTIONS

ON

# PEACH GROWING.

A. E. STENE.

ABSTRACT FROM REPORT OF STATE BOARD OF AGRICULTURE

1910.

PROVIDENCE, R. I.
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1911.

# SOME SUGGESTIONS ON PEACH GROWING.

## INTRODUCTORY.

During the past few years a great many of our people have become interested in the growing of peaches. This fruit has been raised more or less in this State for some time, possibly a century or more, but success has not always crowned the efforts of the growers and few have continued the business for any great number of years. Orchards have been planted and have flourished for a while and have eventually disappointed the grower so that he has discontinued the planting of new orchards. In recent years, however, large growers in other states have demonstrated the practicability of peach growing and developed new methods which, when tried by our own growers, have led to better success. Our up-to-date orchardists have also learned better the soil and cultural conditions which are most favorable to a successful development of peach growing. The result is that to-day there is quite an optimistic feeling among those interested in fruit in regard to the possibility of successful peach raising in the State.

While the writer does not feel that the growing of peaches is due to become a leading industry in the State, nevertheless, it is quite possible to grow the fruit for home consumption and as one of a number of lines to be taken up by our orchardists. We will still have unfavorable climatic conditions and there will be years when the best of planning and efforts will result only in disappointment, nevertheless, with a better knowledge of how to choose the soil and site, the care of the trees, and the varieties to be planted, we can hope to make the industry sufficiently profitable so that peach orcharding will be worth considering by fruit growers in many parts of Rhode Island.

From the market standpoint, conditions are quite favorable. Southern peaches, owing to the fact that they have to be picked in more or less of a green state, and also to the fact that the quality of southern fruit is seldom as good as that grown in the north, can never successfully compete with the native-grown article. When our native-grown fruit is placed on the market, southern-grown fruit is relegated to a secondary place at a lower price.

This little bulletin is intended to present only a mere outline of peach culture. It was the purpose of the writer to gather as complete data and information bearing on the growing of peaches in this State as could be gotten, but owing to a lack of the necessary time, this collection of information will have to be extended over a somewhat longer period and the present publication is offered simply as a preliminary bulletin called forth by the urgent demand for the most elementary information regarding peach culture.

## SHALL PEACH TREES BE PLANTED OR NOT.

This is a question which every orchardist must study carefully for himself. As with other lines of fruit growing, much depends, first on the personal equation; that is whether the orchardist has sufficient persistence to continue the work in spite of possible failures at the beginning, and whether he is willing to study his problems with a view to overcoming his difficulties; and second, on the location of the land on which the orchard is to be planted.

## LOCATION AND SITE.

So far as can be ascertained, it seems possible that peaches can be successfully grown over a very large part of the State, provided the site is suitable. Success has seldom followed the planting of peaches on low land. Hillsides, or at least places where air drainage is good seem to be more likely to give success.

The question of exposure has been discussed pro and con without any very definite conclusions being arrived at. It has usually been advocated that a northern exposure is better because there would be less likelihood of the trees starting into growth early in the spring and being caught as a consequence by late frosts. Reports from the northern part of the State seem to indicate, however, that in some seasons when frosts have been prevalent the only crop worth while was on trees with a south or southeast exposure. It is the writer's personal opinion that an east slope is probably most desirable, although as already stated, there is no very definite proof that this is better than any other.

## SOIL.

The peach tree is perhaps less particular in regard to the kind of soil on which it grows than any other orchard tree that we have. Peaches have been successfully grown on a great variety of soils. The best results, however, seem to come from a light rather than a heavy soil, and a sandy or stony loam is probably better than clay. Very heavy clays or soils which are likely to be wet should not be chosen.

## PREPARATION OF THE LAND.

Peach trees require higher cultivation than apples or pears. To try to grow peaches on the mulch system, which is sometimes possible with apples, would be to invite failure at the outset. It is therefore well to have the land in good shape before setting out the orchard. Land on which corn or other cultivated crops have been grown would be in excellent condition for a peach orchard. A moderate amount of rocks, such as is found in a good many fields of the State, are not necessarily an objection, provided the field, as stated above, can be thoroughly cultivated.

## DISTANCE APART OF PLANTING.

This is still a somewhat debatable question, but a safe suggestion is to say that the trees should be set about 18 feet apart each way, or if one is anxious to save space, 18 x 16 feet. This permits easy access to different parts of the orchard for the purpose of carrying away fruit or for cultivation, and gives plenty of room for the trees to grow to full size.

In laying out the orchard the land may be staked out in rows, and furrows run lengthwise and crossways of the field. By proper staking at the sides and sighting across the field, two men can easily set the trees in line sufficiently accurate for all practical purposes. The plowing will serve to loosen up the soil and to simplify the labor of digging the holes.

## THE NURSERY STOCK.

The best trees to purchase are one year old stock. With older trees it is more difficult to form the head where it is wanted; they are far more expensive, and the gain in time is not sufficient to make it worth while to pay the extra price.

It is well to order stock early. In recent years there has been a large demand for fruit trees and late in the season many nurseries have run short of stock as a result of which the trees have generally been higher in price.

The question of whether to secure trees from the south, where yellows are not prevalent, or to order from northern nurseries has been debated a great deal. The writer has endeavored to find out whether anyone knows definitely whether the theory that southern trees are less likely to have the yellows is based on fact, but without success. The principal argument in favor of southern trees seems to be that they are likely to be stronger and better grown. For this reason, therefore, and perhaps in order to give the theory the benefit of the doubt, it would be advisable to order southern trees.

In endeavoring to purchase trees at the lowest price, one should be careful not to buy cheap trees. Such stock would be expensive at any price. Buy of some well-known nurseryman who has a reputation at stake. You are then more likely to get the varieties which you order.

In regard to varieties, there is some difference of opinion among our growers. It is of course desirable to get the hardiest varieties that can be obtained. Of these the Greensboro is perhaps the hardiest, followed by the Carman, Elberta, Mountain Rose, Chairs Choice, Crawford—Early and Late, Stevens Rareripe, and Hiley. Champion, Waddel, Belle of Georgia, Stump, and Crosby also have their advocates.

## PRUNING.

The first pruning should be given at the time of planting. The young tree should be cut back to a whip and to a height depending somewhat on the height of the top to be formed. There is some difference of opinion as to how low peach trees should be headed, but the majority of growers are in favor of a top even lower than that advocated for apples, and suggest a height of from 18 to 30 inches at the first pruning. Later pruning depends so much on the individual tree that it is difficult to give any definite directions in regard to it. It is well to keep in mind that the top should be fairly open. Interfering branches should be cut out and when the trees come into bearing, it is customary to cut back about one-half of each year's growth. This is done to check the skyward tendency which all peach trees have, also to limit the amount of fruit per tree. Some exceptions, however, should be noted. After heavy, sharp frosts which have injured the trees to a serious extent, pruning may have to be very severe. On the other hand, lighter frosts which have only injured a few of the buds may require a lighter pruning in order not to cut away too many of the healthy fruit buds.

## CULTIVATION.

As already stated, peach trees should be carefully cultivated every year during the first part of the season. Where the need of nitrogen is indicated by the color of the foliage and growth of the trees, it may be well to plant a cover crop of some legume during the early part of August. Many growers are finding, however, that a sharp lookout must be kept not to furnish too much nitrogen because it creates too vigorous a growth which may result in less resistance to the effects of heavy frosts during the winter or early spring. When this is the case, no crop is planted and weeds are permitted to grow up to cover the soil and prevent washing during the winter.

The entire surface of the peach orchard need not necessarily be cultivated. In fact, some of the large commercial growers leave a space around the trees without cultivation. This will grow up to weeds more or less, but it is argued that they do but very little harm, and as the feeding roots of the tree are some distance away from the trunk, the land occupied by the weeds is not of any use to the trees themselves.

## FERTILIZATION.

We are now coming to realize that the reason our orchards are not producing as good crops as they use to is, in part at least, due to the exhaustion of the soil. Fruit requires plant food just as much as corn and potatoes, only in a somewhat different form or degree.

If we plant a peach orchard, therefore, we must make up our minds at the outset that we should supply the plant food required in the form of manures or fertilizers.

When the land is prepared and while the trees are making a growth barnyard manure may be used. After they have come into bearing, however, barnyard manure should not be applied because it supplies too much nitrogen. As stated above, it may be a question as to whether any nitrogen should be given. Potash and phosphoric acid, on the other hand, are generally required. The former may be applied as wood ashes; in fact, an occasional application in this form is always desirable. The same results may be gotten by the application of lime and potash in some other form. Potash may be applied as muriate or sulphate and lime may be applied as fine ground limestone, agricultural or air-slaked lime, quick-lime slaked in the field, or in basic slag. If basic slag is used, the necessary phosphoric acid is, of course, also provided.

The following annual applications per acre when the trees are in bearing may be suggested:

200 to 300 pounds of muriate or sulphate of potash.
500 to 800 pounds of acid phosphate.

If this is to be the form in which the fertilizer is applied, the land should be well limed before the trees are planted, or the fertilizer may to advantage be changed by leaving out the muriate or sulphate of potash and applying wood ashes, or by leaving out the acid phosphate and applying basic slag. Should the trees need a little nitrogen, fine ground bone or bone tankage may be supplied in place of the acid phosphate.

Another way of course, if the growth of the plant indicates that nitrogen is desirable, would be to add a small amount of nitrate of soda to the formula above given.

The quantities above given are intended for one acre of ground. The fertilizer should always be applied in the spring of the year before the ground is plowed or cultivated.

## INSECT ENEMIES AND PLANT DISEASES.

### INSECT ENEMIES.

The peach has a number of very serious enemies among insects and plant diseases. Among the insects it is probable that the *San Jose scale* may be considered the most persistent enemy if not the most difficult to combat. This little pest seems to have a special liking for peach trees and if it is found anywhere in the neighborhood, peaches are sure sooner or later to become infested. The insect, while very small, multiplies exceedingly rapidly and after a tree is once infested, it is a question of only a very short time when the pest will have spread over the entire tree and will eventually destroy it.

As an illustration of the rapidity with which the insect multiplies, it has been calculated that if the progeny of a single female which winters over in the latitude of Washington, D. C., were permitted to live and multiply without any check from enemies or unfavorable climatic conditions, the number would amount to three billions in the fall of the year when sharp frosts set in to check further development.

The San Jose scale differs from the scale insects with which we have been accustomed to deal in that the young insects begin to appear early in the spring and continue to come forth without a let up until late fall. The oyster-shell scale, which may be considered as a type of our older established scales, winters over in the egg stage and these eggs hatch about the last part of May or the first of June, and thereafter there is no further appearance of the young scale insects. The San Jose scale winters over in the immature or larval stage, completes its growth in the spring, and then the female continues to reproduce young for about six weeks. It takes from about thirty-two to thirty-eight days during the summer time for a young scale insect to come to maturity, so that we can have several generations during the season. The young insects crawl around for two or three days after birth, and on finding a suitable location, proceed to insert a long sucking tube into the bark. As soon as located, the insect throws out through pores in its back a wax-like substance which on contact with the air hardens, and thus gradually forms the scale covering. As legs are of no further use to the insect, they drop away with the first moult and the insect is thereafter scarcely anything but a sack-like structure with a sucking tube through which the food may be absorbed from the cell sap of the tree. The female remains in this quiescent condition until her death. The male on maturity acquires wings, backs out from under its scale covering, and passes a brief period of existence in the open air.

Owing to the continuous production of the young insects, the old method of spraying with summer contact sprays was found to be useless, or too laborious and expensive. Sprays of a stronger caustic nature have, therefore, been developed, and these are now considered entirely successful. Miscible oils are used and recommended by many, but the lime-sulfur washes are considered by far the best. One can use either the home-boiled wash made from 15 pounds of sulfur, 15 pounds of lime, and 50 gallons of water, or the concentrated solutions which can be bought on the market. Home-made mixtures, if large quantities are needed, are perhaps a little cheaper, but for those who wish only a comparatively small amount, one of the good commercial brands will be fully as good, and by using them, one avoids the disagreeable task of preparing the wash oneself.

If the tree is badly infested, a spraying should be given in the fall of the year, followed by another early in the spring just before the buds open. If only one spraying is to be given and the time required need not be considered, the spring application is the most important for the reason that this has a tendency to aid in preventing the development of plant diseases. In fact, as will be stated later, spraying with lime-sulfur in the spring is considered a good preventive against the leaf curl and an important aid in the control of the brown rot.

The next most important pest of the peach is probably the *peach tree borer*. The larvae of this insect work in the sap wood of the tree near the ground. The adult is a rather pretty clear winged moth. Eggs are laid near the base of the tree and on hatching, the young larvae bore through the bark and remain protected from most enemies until the time that they are ready to come out again as moths.

Various washes have been recommended, the purpose of which is to prevent the laying of eggs or the development of the larvae after the eggs are hatched. While some have had more or less success with such preparations, the consensus of opinion among growers today is that digging the larvae out is the surest and best method. The trees should be gone over carefully in June and again in September, and whenever the characteristic masses of gum and wood particles thrown out by the borer are found, the orchardist must dig into the bark until the borer is found and destroyed.

Another insect which is sometimes considered quite injurious to peach trees is the *fruit tree bark beetle*, or, as it is sometimes called on account of its characteristic work, the shot hole borer. This insect makes little, round holes in the bark about the size of those which would be produced by number 7 shot. This insect would be rather difficult to control, but fortunately, it is not likely to be destructive to trees which are kept in a thrifty growing condition.

Another insect which causes considerable injury to the fruit is the *plum curculio*. The injury of the larva itself is seldom of much account but, as in the case of apples, the wound which the female curculio produces in the surface of the peach is likely to disfigure the fruit and to form a starting place for the development of peach scab or the entrance of spores which produce the brown rot.

## PLANT DISEASES.

The disease most feared by peach growers is undoubtedly the *yellows*. In spite of careful and persistent study of this disease by specialists all over the country, all the efforts to discover its nature or methods of treatment have been completely baffled. Today we only know the characteristic symptoms attendant upon the appearance of the disease and that it is probably contagious. It has also been learned that the disease is probably always fatal to a tree. For these various reasons, it is recommended that as soon as a tree has been found to be affected with this disease, it should be cut down at once, removing a part of the larger roots, and taken out of the orchard as soon as possible. Based on the belief that it may be transmitted to other trees by contact, many recommend that the removal of diseased trees should be carefully carried out in order that other trees may not be infected.

The disease is not supposed to harbor in the soil and a new tree may be set in the place from which the diseased one was removed with as good prospect that it will develop into a bearing tree as any of those which stand nearby.

Peculiarly enough, the disease has not developed in certain parts of the southern states, and it is assumed for this reason that nursery stock grown in the yellows-free belt is more likely to be free from the disease than stock grown farther north. Whether this theory is worth considering or not is still a debatable question.

Another disease which sometimes occasions a great deal of loss through weakening the trees is the *peach leaf curl*. This disease is produced by a fungus which causes the production of abnormal tissues in the leaves and the wrinkling, swelling, and crumpling up of the leaf blade. It sometimes also attacks the petiole and even the young twigs. This disease lives over winter on the young twigs, and it has been found that a thorough spraying with Bordeaux mixture in the spring of the year before the buds break is practically a complete preventive of injury therefrom. Since the San Jose scale has come in, necessitating the spraying with lime-sulfur, this mixture has been found to produce about equally good results.

*Brown rot* is probably the worst disease of the fruit of peach trees that we have. It is more prevalent some seasons than others, depending upon weather conditions whether they are favorable or unfavorable to the development of the fungus which causes it. Some varieties also are more subject to it than others. A few years ago this disease seemed to baffle growers quite a little on account of the fact that ordinary sprays could not be applied without danger of burning the foliage. Recent work by the department of agriculture at Washington seems to indicate that an excellent remedy has been found in the self-boiled lime-sulfur wash. A course of spraying to prevent this injury should begin with a spring application for the San Jose scale and leaf curl. This should be followed after the blossoms have dropped with a number of sprayings with the self-boiled wash applied two or three weeks apart until the peaches are approaching maturity.

The self-boiled lime-sulfur is prepared by combining 8 pounds of first-class quicklime, 8 pounds of fine ground sulfur and 50 gallons of water. The lime should be slaked with a small amount of water and while this slaking is going on, the powdered sulfur should be added. The mixture should be stirred thoroughly and then the vessel in which the slaking takes place should be covered over and allowed to stand until the ebullition ceases. Cold water should then be added to stop further dissolving of the sulfur. This mixture must not be applied when the fruit is beginning to ripen because it is liable to cause a stain.

The same course of treatment is also fairly effective against another fungous disease commonly known as *peach scab*. This disease causes a blackening and roughening of the surface of the peach and spoils its appearance for marketing purposes.

## HARVESTING AND MARKETING.

The peach is a perishable fruit and the chief advantage which local growers have over those situated at some distance is the fact that home-grown fruit can be permitted to ripen on the trees and will, therefore, attain a better flavor than that which is shipped in from a distance and which must on that account be picked a little green in order to stand shipment. Our growers should, therefore, learn how to pick the fruit at precisely the proper time, considered from the standpoint of ripeness and high flavor. A trained picker knows when the fruit is ripe from the appearance of the fruit and from the feeling of it when taken between the thumb and first two fingers. It is difficult to describe the condition of peaches when they have reached the proper time for picking. About all that can be said is that the fruit should have attained a good color for the variety and should be slightly soft to the touch when grasped as above suggested.

The statement that apples when picked should be handled like eggs is still more applicable to peaches. The substance of a peach is much softer than that of the apple and a slight bruise will cause disfigurement and decay very quickly. Care in handling applies not only to the time of picking, but also to the handling of the packages after the fruit has been picked and in transporting them to the market. A spring wagon for the purpose of carrying the packages both from the orchards and to the market is an absolute necessity.

As to packages little need be said. Almost everyone is familiar with the so-called "ten quart" peach basket, which is the most common package. For the very highest grade of fruit and for the convenience of certain buyers, a somewhat smaller package is advisable. The size of such package will depend so much upon the demands of the market and of the individual purchasers that it would be difficult to prescribe.

# PROCEEDINGS

OF THE

# FARMERS' INSTITUTE

UNDER AUSPICES OF

# Rhode Island State Board of Agriculture,

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FEBRUARY 9th AND 10th, 1910.

# PROCEEDINGS AT THE FARMERS' INSTITUTE, UNDER AUSPICES OF RHODE ISLAND STATE BOARD OF AGRICULTURE, AT THE ELYSIUM, 183 WEYBOSSET STREET, PROVIDENCE, FEBRUARY 9TH AND 10TH, 1910.

## February 9th—Afternoon Session, 2 P. M.

Hon. William Williams, Presiding.

*By the Chairman.*—Ladies and gentlemen, the meeting will please come to order.

We are convened here to-day to discuss the most important subject that can be considered. Long after the questionable politics and the more questionable politicians have passed into what Carlyle calls the grim eternities, the services of President Roosevelt will be gratefully remembered as having brought to the American people, the necessity of the conservation of the sources of wealth, and there can be no greater wealth that the conservation of men's energies.

It is unnecessary, even if it were possible, to exaggerate the importance of such an education for the young,—and why should it be confined to the young,—as will relieve the country from the curse of pauperism and enable them to adapt themselves to the conditions that nature has imposed, which are too often ignored in our present system.

The practical application of science, and I use the word in its proper definition as knowledge, teaches us the imperative necessity of adapting means to ends. All material life is a mathematical problem, and it is only when we insist upon the recognition of this fundamental principle that satisfactory and permanent results can follow. If but one factor is wanting in the evolution of this principle, mathematical results cannot be obtained and the little rift within the lute will destroy the harmony.

As a working hypothesis, it must be conceded that man is an animal, though it were well not to insist upon the too rigid application of this definition lest we be plunged into the abyss of ethical and religious negation.

In the consideration of what should be done with a child we must insist upon holding the parent to a strict accountability for the life of the child; for it is an asset of the State, and every and all laws that relieve or attempt to relieve the parent of this responsibility will inevitably lead to the dissolution of the State. Without any desire to encroach upon the presentation of the case that you will hear from the well-qualified gentlemen who are authorities on the subject of education, permit me to remind you that as profound a scientist as Herbert Spencer said that no child should be sent to school under seven years of age. It is doubtful if any writer of any age (that wise madman Rousseau not excepted) has ever treated the subject in so logical a manner as John Locke, the author of the "Essay on the Human Understanding." He was the friend and companion of John Milton, and it requires no stretch of imagination to conceive that these two great scholars often discussed the subject of education and were probably in hearty accord. It is interesting to recall, as illustrating how far we have travelled since then, that Locke was asked to write a constitution for Carolina, which, however, was rejected as being too tolerant in matters of religion. Is it not true that our present system of education is extravagant, not only in the enormous expenditure of money, but, what is of far more consequence, in the waste of that irreparable factor, the time of millions of children, which is in all cases the capital of the child, of which we are the self-constituted guardians?

In conclusion let me offer a few seeds for thought. The universal cry of "Back to the Land" is but a tardy recognition of the undying truths that segregation is better than aggregation and school gardens are its crude expression. Why then should we still continue to expend millions in enormous structures in densely populated districts where every condition of health is violated? Can anything be more absurb than the classification of children for all studies? Pegasus cannot be yoked with a cart-horse. Is it not known in warfare, whether naval or military, that neither an army or a fleet can move more rapidly that its slowest members? Should the ill and the well, the clean and the foul, be associated together? Is the unimpeachable truth recognized in popular education that the concrete should precede the abstract?

He who denies the existence of these evils must be unobservant, and he who acknowledges them must be an accessory until the remedy is applied. If it be said that it is difficult to correct these evils, then there is no time to be lost in applying a remedy, and if it is declared to be impossible to construct a sane, logical, and philosophical system of education, then we must remember that a chain is no stronger than its weakest link, and chaos is come again. Were I asked to suggest a simple, plain, economical system of education, and no other should be entertained in view of a taxation that is assuming threatening proportions, I would say that before all we must remember that the children of the working classes, composing the best majority of the scholars, cannot, by the necessities of the case, devote more than a few years to education. (Applause.)

*By the Chairman.*—I have great pleasure now in calling upon President, Howard Edwards, of the Rhode Island State College, to address us on the subject of industrial education.

## THE NEED FOR INDUSTRIAL EDUCATION.

HOWARD EDWARDS, PRESIDENT R. I. STATE COLLEGE.

There is to-day much talk, in all gatherings of men and women, about education. Associations for the advancement of science, engineering societies, labor unions, political meetings, manufacturing organizations, religious conferences, and now this round-up farmers' institute—all are likely to begin and end their proceedings with more or less elaborate discussion on education. Why is this, and what is it all about? Has not education been carried on in all countries, and at all times since history began? Should not the raw material and the processes of education throughout all these ages have become standardized and stereotyped, so that there need be no longer any discussion, at least about the basal facts of the art? It would seem so; and yet, as we hear and read the elaborate discussions of this subject, not merely by laymen but also by professional teachers, we begin to realize profoundly that, after all, practically nothing is settled, either as to the subject or the process, that ideas concerning education are in a state of flux and transition, that each speaker or writer deals with a conception of education different from that of another, and uses a language only partially understood by that other.

Yet it is only a comparatively short time ago that both the subject-matter and the process of education were as definitely understood, and thoroughly agreed upon as are the orbits of the planets or the morality of the ten commandments. Education for the common man was the process of learning to read, write and cypher. For the scholar, it was the attainment of mental power and culture through the study of mathematics, Latin and Greek. The methods pursued were sternly logical—first, mental abstractions, the result of generations of painful analysis; then, elementary combinations never before realized by human sense; finally, concrete synthesis approaching actual objects, but not realized as familiar because of the wonderful mode of approach to them. My earliest copybook contains whole pages of effort to imitate the curve of the letter "a" without the faintest idea of what the curve should serve for. I learned five Latin declensions with innumerable rules for determining whether a word belonged to one declension or another, without having the faintest idea of what it was all about, and with the growing conviction that Latin could never by any possibility have served as a living means of communication for any real people on earth at any time. It was a beautiful school system, however; so restful to the teacher's powers of initiative, so destructive of any imaginative or creative instinct on the part of the student; so delightfully automatic as a means of determining the pupil's power of memory and of docile inanity, through examinations that could be mathematically graded to the hundredth of one per cent.

The revulsion from this system has been to the schools like some elemental cataclysm of nature, or like the wild tumult of some mighty arctic river when the forces of spring cause it to heave against its icy banks, crushing them in pieces, tossing the fragments in mad collision, and surging forward far beyond its banks in wild joy over its new-won liberty.

I desire briefly to discuss the forces that have brought about this break with the past, and to indicate the scope and beneficent working of the industrial education that has so far won its way.

And first there came a vague feeling of unrest and dissatisfaction with the results of the old-school processes. The opinion became more or less current among the people that success in school tasks bore no relation to success in actual life. The dunce at school frequently became the business man of sound judgment, splendid initiative, and high esteem in the community, while the question was a favorite one for current speculation,—why is the honor man at school so frequently lost to sight in actual life?

It was pointed out that, if the school training of the time should be effective anywhere, it was in the literary world; yet taking the whole range of English literature, it is a question whether better results have been obtained with or without the training of the schools. The greatest genius of our race, Shakespeare, had little of its training; Bunyan and Burns had less; Chaucer had slowly and painfully to release himself from the trammels of scholarship before he was able to do his best work. The school itself does not always seem to have recognized literary genius even when it came within its influence. Swift, Goldsmith, and Shelley were in constant disgrace at school, and it is gravely recorded of Swift that he failed to take his degree because of "dullness and insufficiency." If the school failed to recognize its own, the genius equally failed to appreciate the school. Dr. Johnson, Gibbon, Spencer, Thackeray, Lord Bacon, and Sir Walter Raleigh left college without taking a degree. Bacon recorded his deep scorn for the processes he found at the schools. Gibbon says that the fourteen months of his stay at college were idly and unprofitably spent. Swift thought of writing an Account of the Kindgom of Absurdities to give expression to his disgust for the routine of scholastic training. Pope lampooned his teacher and, at twelve, assumed the direction of his own education. Cowper says that he and Lord Thurlow spent their time in giggling and making giggle. Byron devoured all sorts of learning except that which was prescribed. Scott pursued desultory reading instead of the regular course. Dickens says that the boys at his school trained the white mice better than the masters trained the boys. Worst of all, Milton, bright particular star of classicism, most serious and powerful genius of his time, prodigy of the schools, writes a tractate attacking all prevailing systems of education, wherein he speaks of the "many instances which have made learning generally so unpleasing and unsuccessful;" of "matters to be wrung from poor striplings, like blood out of the nose or the plucking of untimely fruit;" of spending "seven or eight years merely in scraping together so much miserable Latin and Greek as might be learned otherwise easily and delightfully in one year."

When popular government was established in this country, it became evident that if it were to be successful, there must be among the rank and file of the people a high degree of knowledge and intelligence. To this end, schools free to all, at public expense, were established. The idea is embodied in that famous phrase of the Constitution of Massachusetts: "Wisdom and knowledge as well as virtue, diffused generally among the body of the people being necessary for the preservation of their rights and liberties . . . it shall be the duty of legislatures and magistrates in all future periods of this commonwealth to cherish the interests of literature and the sciences and all seminaries of them." What we evidently desired to do was to establish schools that would inform and train the boy and girl for citizenship, and for carrying on the daily life of the home, the shop, and the street. What we did was to transfer to America the school-training of the well-to-do English middle-class gentleman, with ambition toward the learned professions, toward the elegant pleasures of social life, or toward political preferment. Is it any wonder that the prescription did not meet the needs of the case? Ours is a social organization in which the farmer, the groceryman, the mechanician, the bridge-builder, stand on a social plane with the editor, the literary man, the lawyer and the preacher. We needed a school system, that, while elevating and refining the mental and spiritual nature, should concern itself equally with the occupations as with the professions. What we got was a school atmosphere and subject-matter borrowed from a society that placed the hand-worker on a much lower plane than the head-worker, a society that valued education avowedly as a means of raising one above the necessity for labor, a society whose educational system must recognize the existence of those ideas of rank and privilege and caste on which the national existence is based. What we have done is, not to democratize the education imparted, but to make free for all the aristocratic education of the privileged class in a social order permeated with the idea of caste. We have taken the factory girl and educated her into the ideals, tastes and ambitions of the favored social aristocrat. Is there any wonder that she rebels against the painful limitations of her home; that she is ashamed of the coarse toil of her father, and blushes for the hard hands of the mother that bore her? Is it any wonder that employers complain of the unwholesome effect of the school on their apprentices, and that farmers insist that education takes the sons away from the farm? Is there not truth in these complaints, and would it not be wonderful if, under such conditions, the results were different? Have we or have we not taught them the dignity of labor, of which we prate so much? Have we or have we not helped them actually to associate culture of spirit and refinement of thought with calloused hands and aching muscles? Have we not rather, both through actual practice and through a subtle sort of indirect suggestion, and frequently by very direct actual precept, taught the utter incompatibility of conventional culture and labor?

At this point, however, another phase of the matter has to be considered. Until fairly recently, the American home has been a powerful corrective for the school, and the American home has always been singularly democratic. All through our broad land, the overwhelming majority were neither excessively wealthy nor abjectly poor. In all these homes, whether of the rich or of the poor, there was work to be done, and the spirit of the times was to insist that it be done by the children. One of the maxims of all well-ordered homes was that the children should be kept busy and should be taught to make themselves handy. And in the home of those days there was ample opportunity for employment. Think for a moment how many of the industrial occupations that to-day are centered in great factories formed in those earlier days a part of the routine duties of the home. Included in the housework was not merely the cleaning and righting up, and the actual preparation of food for the table. Nearly every article of consumption in the home—food, clothing, fuel, even furniture—all had to be provided and prepared by wise foresight and persistent effort. Each season had its well-defined duties, insistent, imperative, unremitting. Things were bought, when bought at all, as what would now be called raw material, and the processes of preparation were a part of the routine duties of the home. The larder had to be stocked for long periods ahead, and had to be kept stocked as the products of the season came on. In short, the average home was a busy factory, in which rudimentary processes of a hundred trades were carried on;

and the young people, both boys and girls, learned at home a thousand things, both of fact and process. Willingly or unwillingly, they were forced by the circumstances to take part in an endless succession of duties whose very monotonous insistence gave skill of hand and eye, while at the same time training to industry, initiative, thrift, and the exercise of sound judgment. The mother, as a "notable housewife," taught the girls not only to know, but also to do, the household duties. The boys had the household chores; and then, too, the work of the father, whatever it was, was carried on in such close connection with the home, sometimes, indeed, in the house itself, that the boys came into the most intimate contact and acquaintance, and frequently participation, with it. For all, the home was indeed a great industrial school in which the father and mother were skilled and practiced teachers, where constant companionship and example gave every occasion for the inculcation of lessons of skill, sobriety, and industry, and where changing conditions and unforeseen exigencies called forth promptness and decision of character.

By this admirable influence of the home, the defects of the school previously pointed out were minimized and counteracted. If we look closely into the situation as a whole, I think we shall find that of the total influence brought to bear upon the boy or girl, the school exercised a far smaller part than it does to-day, while the part of the home was greatly magnified. The school was the place for obtaining "book-learning." It had little to do with the moral and religious life of the pupil. That was the affair of the home and the church. Of training for citizenship, little could be or was done. Indeed any reference to current political affairs was conscientiously avoided as dangerous to the integrity of the school. That, too, was the affair of the home with which the teacher should not and must not intermeddle. Furthest of all from the sphere of the school was the idea of responsibility in connection with future occupation. Indeed, the teacher was by experience and training least of all fitted for advice and direction in these matters. Here again the home was the controlling and directive agency and the school had no part nor lot in the matter; unless, perchance, in the case of some lad unusually gifted in expression the teacher should remonstrate with the parent on throwing such talent away on "mere farming or merchandizing."

Now I think it will be agreed that, in response to change of environment, there has been a tremendous change in the conditions in the American home. I do not mean to lay it as a fault, but simply to state facts when I say that, even in the country home, and far more in the city home, there is little for the child to do. The numerous thrifty occupations of the home have become the processes of the great factory. We buy things to-day in the finished state, ready for consumption, and delivered daily or hourly, as part of the purchase price. If we had ample time to give to the problem, it would puzzle our brains to find employment for the restless hands and minds of the children. But, indeed, we have not the time. Society is rapidly stratifying itself among us, just as in the old world. The upper class lives at a pace that is fatal to the old ideas of the home. The mother has nerve-racking social duties; the father is absorbed in business affairs that he never brings into the home life. Among the poorer class the time and energy of both father and mother are utterly consumed in the effort to provide food and clothing, and there is little opportunity for real home life. I could give you flagrant examples from my own observation, but let me refer you rather to the public records of the children's courts. A wealthy father was asked, "How often do you see your son?" "About once a week," was the reply, "but the governess is always with him." "Has the boy a mother, too?" "Yes, she is in Florida just now."

Because of this tremendous change the responsibility of the school is to-day correspondingly enlarged, and is steadily increasing. First came the necessity for teaching hygiene—the care of the body, cleanliness; the abuse of narcotics. The sphere of the school's moral influence has grown steadily and almost imperceptibly, until to-day this function is universally recognized as by far the most important. The only question is how best to reach and train the moral sense. Closely bound up with the moral issue is the cultivation of the idea of social responsibility and service on which will depend the future safety of the republic. I do not hesitate to say that, as a whole, the very best work of the modern school is being done in this direction, and if it accomplished no other end than this, it would be well worth all that it costs to the community and the nation. I wonder, sometimes, at the shortsightedness of the wealthy who complain of or actually evade our school taxes. The stability and value of their property rights rests entirely on the loyalty of our people to their government, on their faith in its justice and equity, and their wisdom and self-control in shaping and directing it. I say this even to-day, too, in spite of the cynicism of Mr. Worldlywiseman and his declaration that popular education is positively immoral. The time is far gone when a great nation can be governed and property rights maintained by anything other than the knowledge and wisdom of the masses of the people.

Thus the school to-day is charged with the duty of training to intellectual strength and culture, to soundness of body and purity of blood, to integrity and steadfastness of character; and to intelligence and loyalty in the discharge of the duties of citizenship. All this it has been compelled to take over in large part from the home, and it is because of the recognition of this enlarged sphere that it is so much discussed. Part of this discussion, however, proceeds on the question of the one phase of life still unappropriated by the school, still left for the home to wrestle with—the matter of vocation or occupation.

The argument for taking on responsibility in this direction seems to me overwhelming. All the previous discussion has been intended to show the trend of this argument, as follows, viz.: (1) that the traditional school curriculum, absorbing a vast amount of time as it did, was not only unsuited to the training of the masses in a democratic school community, but that it was condemned by the wisest and best among the special literary class for which it was particularly designed. Hence it could readily be remodeled in the interest of the masses. (2) That, up to comparatively recently, the home had given the industrial training which the school had failed to give, and with this training had imparted the self-dependence, initiative, and sound judgment which the schools had tended rather to suppress. And (3) that the home, because of change in modes of living, could no longer be depended upon to perform this function; and, consequently, the school must take it over, as it had been compelled to take over the care of health, of morals, and of public responsibility.

To this line of argument must briefly be added the argument from the fact of enormous industrial changes. Three things have produced these changes: (1) the production, transmission, and application of power in adequate amount and at cheap rates; (2) the invention of wonderfully efficient, powerful, and complicated machinery, performing automatically the tasks of hundreds of men with an intelligence almost uncanny, and with a precision unattainable by human hands; and (3) the application of science to all the phases of human effort, evolving an industrial life that demands intimate acquaintance with the most recondite processes of nature. To meet these changed conditions, there is demanded (1) greater and more spontaneous initiative than ever before; (2) intelligent brain and hands trained to work together efficiently; (3) a knowledge of natural forces and processes carried to the limit of human achievement; (4) training in the processes of experimentation, discovery, and invention to the end that further advance may be made; (5) a knowledge of the interrelation of all the complicated parts that together make up human society, in order that each unit may recognize the rights of every other unit and all may work together in harmony and sympathy for the welfare of humanity.

It would seem that the mere statement of such an analysis would suffice to show the need for the introduction of industrial and vocational training into the schools. Had the home remained as it originally was, it could not give the systematic training and knowledge here required. These must begin very simply, with such hand instruction as we now call manual training, or nature study, and school gardens; it must widen and deepen its scope, as time progresses, to include more and more of such things as the elements of mechanical construction, the sources of power, the forms and methods of transmission and application, the sciences that bear upon some particular phase of human endeavor, as agriculture or engineering; the methods and processes in actual use on the farm or in the mill or shop; the present applications of the sciences previously pursued, the administrative or directive side of farm or mill supervision; and so on, as far as the student is able to carry his training, until it finds its highest exemplification in the schools for investigation and research. Throughout there must be constant connection and familiarity with vocational processes actually in practice. The work must never be allowed to become antiquated or purely academic.

Where shall such training be given, if not in the schools? When shall it be given, if not from the earlier days of school life onward to the beginnings of differentiation in trade-schools that actually bend all their energies to the vital preparation for some trade, or in apprentice schools; or in actual apprenticeship, or, best of all, in the union of school and shop by the alternating week plan of oscillation from one to the other and back again? How shall it be given, if not in intimate connection and union with those other studies that train more directly to social efficiency, to moral stamina, to noble thought and aspiration, to appreciation of the beautiful in life.

Shall we not give our children this training, then? The lines to-day are being more and more closely drawn. Labor, untrained, unskilled, ignorant of the forces among which it works and the social organism of which it forms so helpless a part, is from the beginning hopelessly handicapped. Listen to the pleadings and threatenings of the unemployed heard all through our own land to-day, but most pitiably in England just at the moment, and realize how hopeless is their case. Skilled labor is in demand, has a recognized position, is a force for the uplift and progress of the nation, a necessity for its very life. Unskilled labor is a drug on the market, a consequent menace to the social organism, a weight to be carried by organized society.

There are those who fear the movement for industrial education, who bewail what they call premature vocational training, and lash themselves into a frenzy of indignation and despair over phantasms that are merely the cunning coinage of their own over-driven brains. Said a recent speaker—"We have drifted as far in materialism as any nation may go and live. Our education is commercialized; where we used to aim at character and culture, we now aim at efficiency and knack. Every study must justify itself in terms of bread and butter; every school must be vocational; and this glorious old Bay State, which once hitched its wagon to a star, now aspires to trundle a wheelbarrow." Now there is not a statement here but is founded on a total misapprehension of the facts, not an expression but is grossly over-driven. The life of this nation is more thoroughly permeated with idealism than any other nation on the globe. Its national hero is not Rockefeller, or Carnegie, or Morgan; but Roosevelt, the preacher of righteousness. Our education is not commercialized because it strives to make a system avowedly designed for all really adapted for all. When did efficiency and skill (presumably what is meant by "knack") become incompatible with character, or, indeed, true culture? Because Massachusetts seeks to establish a more efficient and adequate system of industrial schools to help the masses to keep themselves from being submerged, it is therefore in process of abolishing Harvard and Amherst and Holyoke and Wellesley! Because we propose to feed the hungry and clothe the naked, we therefore design to withhold from these same hungry and naked "the upward look and the sustaining inspiration"! To him who realizes actual conditions and comes in daily contact with the need, how utterly futile and even grotesque such utterances seem.

Despite all such reactionary utterances, the cause of industrial education is moving steadily forward, not losing its head, not rushing into wild excess, not seeking revolution, but evolution; not abandoning the good in the old, but adapting it with the new. And in this movement the farmer, through his agricultural school and college, is taking the lead; determining processes and showing a product in sturdy manhood, in efficient grasp upon life, in loyal and unselfish citizenship, that cannot be gainsaid. (Applause.)

*By the Chairman.*—After listening to the splendid address of the President, we are now to have the privilege of hearing from the Commissioner of the schools of the State of Rhode Island, Hon. Walter E. Ranger, who will speak to us on the agricultural education in the public schools.

## AGRICULTURAL EDUCATION IN THE PUBLIC SCHOOLS.

### WALTER E. RANGER, COMMISSIONER OF PUBLIC SCHOOLS.

In a consideration of the aims and values of the study of agriculture in schools, we may frankly acknowledge at once a weak popular demand for it in Rhode Island. Our people have hardly begun to ask, What is it for? What is it good for? Why do we need it? Only a few believing in its value are asking, How can we get it into the schools for the benefit of our children and youth? Nevertheless, it is becoming everywhere a vital educational question. Following the nature study movement and related to it, the study of agriculture in public schools, through wide-spread discussion and phenomenal progress, has become within ten years a matter of great educational interest and even promises, in connection with other forces, to work in time an evolution in public school education.

Agriculture has been taught for nearly half a century in land-grant or national colleges, but only one agricultural high school was reported twelve years ago, and only eighteen high schools taught agriculture two years ago. Now there are more than one hundred agricultural high schools in seventeen different States and besides several thousand high schools, in twenty-three States, giving instruction in agriculture. Already more than a hundred agricultural colleges are training young men and women to teach agriculture. The introduction and extension of agricultural instruction in elementary schools during the past ten years is equally significant. Recent data show that such instruction is given in the rural schools of forty-four States. Fourteen States by law require that the elements of agriculture be taught in rural schools, and twelve require it in graded schools. Twenty-eight States have enacted special laws, permitting such instruction, while in others, like Rhode Island, local authorities are free to introduce the subject.

With an appreciation of these facts, we cannot regard the study of agriculture as a passing phase of public instruction—a ripple on the waters—but must recognize its progress as indicating a steady movement, or tide, beneath the ever changing subjects and courses of school study, a movement responding to the evolution of our industrial and civic life. We must recognize the fact that we have a real public problem in this matter of the study of agriculture in the public schools, both elementary and secondary. An attempt to solve it can no longer be avoided.

In examining this problem we find it far from simple. It does not mean simply the addition of a new subject of study. It involves new means, new methods, new values, new opportunities, and new aims in school education. It means a transformation of our courses of study, a closer relation between the school life and home life of the child, and in school activities new forms, new life, and a new spirit. Furthermore, agricultural education in public schools is related to (1) country life, (2) vocational education, (3) agricultural education in college, and to (4) essential elements of public school education.

A study of our subject, therefore, leads us into a study of its peculiar relations. First, country life touches school instruction in agriculture on two sides. It is the means and the end of such education. The school is nourished by the life of the people, and in turn enriches society. To introduce the study of agriculture into the schools is a conscious effort to enrich the school, to enlarge its power and to increase its influence through a larger appropriation of the farmer's life, that the school, in turn, may enrich rural life by educating boys and girls for the farm and for worthy citizenship. To keep the pupil in touch with his environment, to open the doors of school wide to the truth and beauty and goodness of nature, to relate the pupil's instruction within the school to his experience without, to make useful things means of culture, to honor the present and future life of the child, and to enlarge his vision of coming life, are subjects of agricultural education. The school thus enriched and energized, many believe, would become a more potent factor for the betterment of country life, and consequently for nobler national life. We need ever to remember that the foundations of the republic were laid by men who tilled their own lands and lived close to the soil—close to the heart of the mother of all life; and that the conservation and betterment of country life will always be a supreme national interest.

It is instructive to observe the correspondence, both in time and purpose, between the spread of agricultural education in school and the great movement to improve agricultural conditions. The former is a part of the latter. It has been pointed out that two radical reforms must be worked out before satisfactory conditions can be established generally in the country. First, the farm lands must be so improved and managed as to yield a more certain and profitable return for labor expended, and afford greater profit for the toiler than employment in the city. Secondly, churches, schools, social conditions, and opportunities for civic preferment must be as good for the masses in the country as in the city. All efficient effort for improving rural conditions must be directed to these ends. It would be a serious error simply to seek to reproduce urban conditions in the country. Much injury has been done in blind efforts to urbanize country schools. Every school exists for the homes it serves and for the community of which it is a part. The country school should be vitalized by the life of the country that it may, through the lives of its children, enrich country life and character. Surely, in the new order of conditions, when it comes, a study and practice of the arts of field and forest will have a place in the country school.

In the second place, another important relation of agricultural education is found in industrial education, itself a phase of vocational education, for which the widespread and increasing demand is already uprooting educational traditions, creating new educational aims, modifying courses of study, establishing new schools, inspiring new visions of popular education, and promises to achieve results that will characterize school and college education of the twentieth century. In the able address of President Edwards, to which we have listened with keen interest, he has made it unnecessary for me to discuss agricultural education as a phase of vocational training. Much that he has said has a direct bearing upon this part of my subject.

A third relation of agricultural education in school is its connection with agricultural education in college. Agricultural education in the public schools in its future development will be closely allied to the work of agricultural colleges. The work of colleges of agriculture in past years, valuable as scientific and technical training, is now unexpectedly to count in public school education. These benefits are to be more widely applied through public schools. The college of agriculture has made possible agricultural education in the public schools. However valuable may have been the service of the "land-grant" colleges in scientific and vocational education, it may well be that in the future they will render a larger service to the public through their influence upon the secondary and elementary schools. If agriculture is to be generally introduced into public schools, certainly the college of agriculure is to have large power in determining its character and a new appraisement of its own value in the efficiency of such public school education.

Our subject reveals an interesting parallel between college and school. As the national colleges were established to give a fitting collegiate education to industrial and agricultural classes, so the end of the movement for industrial and agricultural education in the public schools is to give a school education adapted to the needs of the same classes. The movement in school education corresponds with an older movement in collegiate education. The school as well as the college is to be more closely related to the real life of the people. Cultural and vocational aims in education are not necessarily antagonistic. Cultural values are found alike in the present and past, in the real and ideal, in the natural and spiritual.

Also, in the development of the teaching of agriculture in school, it is to have connection with the work of agricultural boards and farmers' organizations. Especially for the practical introduction of the study these factors are likely to perform important functions.

A fourth relation is found in the school itself. Agricultural education must be related to other elements of school education. More is needed than the simple addition of certain elements of agricultural information to the school curriculum. For the greatest profit to pupils and for real influence on country life, a reorganization of school courses and school practice or methods is required. Country life must be freely admitted to the school, permeating and invigorating all subjects. The useful in school education makes school real and relates school life to home life.

There are four ways of introducing instruction in agriculture into public schools: first, in other subjects, by enriching them with country life and facts of the farm; secondly, as a distinct subject, including the elements of agriculture and taking its place by the side of history and geography; thirdly, as a graded course, adapted for different ages; fourthly, through a new organization of programs and courses, with agriculture as a central subject or important line of study. The simple addition of agriculture and its treatment as a new subject, while it may serve as a beginning in experience, can hardly accomplish desired ends. It must not only have a place of its own, but other subjects must be enriched by the facts of farm life, and the whole school, especially in country, animated by the spirit of country life. Eventually the simple elements of so vast a subject must be selected and organized for presentation to pupils of different ages, and the entire curriculum made over to secure such ends.

Efforts to introduce the teaching of agriculture into our schools will, of course, be greeted with the familiar cries: "Don't crowd school courses," "Too many subjects now," "Don't overwork the children." There is a curious contradiction in popular demands. The public constantly calls for a more rational and useful school education and straightway objects to change in school subjects. Everything besides the "Three R's" has been called a "fad," and without doubt they were once deemed "frills." The ordinary citizen also seems to be under the thralldom of traditional education for culture. He clings to the sacred trio as reverently as the classicist to Latin and Greek. He wants his children educated to earn a living, but questions industrial training in school.

To the thoughtful, what subjects shall be taught in schools is always an open question. So called new subjects are only new views of old subjects or new analyses of human knowledge or experience. Progress in arts and science necessarily causes changes in school arts and study. In a sense, there is only one subject, the universe. The number and variety of subjects of study depends upon the analysis of all men have thought and done and lived. The real question is what subjects and arts are most useful for our schools. The public criticism of "crowded courses" might well be turned to the waste of time incurred in unwise organization or unskilful presentation of subjects.

These considerations bring us close to the crux of our problem. Some of the questions to be determined are,—What facts of agricultural knowledge are to form the subject of agriculture in schools? How are these to be arranged and adapted to the varying capacity of children of different ages? How far can the art or practice of agriculture at school or home be made a part of school work? What methods of instruction will make the teaching of agriculture efficient? How may agriculture best be related to other subjects? For assistance in directing our first experiments, we must look to our State College and Normal School. The one is prepared to give counsel on subject and course, the other on methods of teaching and correlation of subjects. Both must profit by the future experience of schools and together aid in the encouragement and direction of agricultural study.

It is obvious that courses of agricultural study must be differentiated in different schools, namely, high schools, city graded schools, and country schools. In which class of schools may agriculture be logically introduced? For many years, agriculture has been taught in our State College. To extend it to high schools may be thought to be the next logical step. Certainly the opportunities of secondary education would thereby be enlarged and its value increased. Courses in agriculture might well be established in several of our central high schools, following the precedent of commercial and industrial courses. The time may bring a demand for a State high school of agriculture. We now have nearly four hundred students from sixteen towns, attending high schools in other towns. The tuitions of these students, aggregating nearly $20,000, are paid, with State aid, by the towns in which the pupils reside. Evidently such a high school would have reasonable patronage.

Many will judge that if agriculture is to have a place in any elementary school, it should be established first in our country schools. We will doubtless agree that it has a fitting place there and recognize large opportunities for it. I have already suggested the true relation of country school to country home. But not a few will fail to see why the study of agriculture should have a place in city graded schools. But as a subject of universal interest, like geography or history, it is not unworthy of attention in any school. In all our public schools, even in city, the great subject of husbandry, like commerce, may not be ignored. The city child is poor indeed if his eyes are never turned toward the open country and his heart is never touched by the wonderful life of farm and forest.

I might present an array of impressive statistics showing the need of change, or improvement, in our country schools. I might marshal a phalanx of reasons, mustered by others, why the study of agriculture should have a place in public schools. But my object is simply to give a plain statement of the situation. I might well attempt to offer practical suggestions for the solution of the problem of agricultural education, but such solution will be worked out only in the experience of country homes and schools. To take the first step is the beginning of the solution. He who introduces the subject into a school will do most to prove its worth. It seems practicable for any school, especially rural, to begin the study of agriculture.

The school of fifty years ago may have been adapted to the primitive condition of that time. It is no longer adequate to the needs of to-day. We need a new kind of school in the country, not the city graded school, but a school of the country, by the country, for the country. Farmers need a vision of a new country school. They need a faith that a good country school for their children is possible and within their means. Certainly the school for the children of the farm should abide in the life of the farm, even as the little schoolhouse stands on hillside or in the valley.

*By the Chairman.*—It is customary at these meetings to have public discussion. You have heard the view of the two gentlemen who have endeavored to show us the need of industrial education and agricultural education in public schools, and no doubt many of you have formed your opinion in connection with these subjects. Is there any lady or gentleman who wishes to make any remark?

*Dr. H. J. Wheeler.*—I would like to introduce a resolution at this meeting, if it is proper. I wish to say that we have been interested for some time, and been trying to do something, in our town of South Kingstown, for the ninety per cent. of the pupils who have been neglected in connection with their agricultural education. The course of instruction up to the present time—the whole stress in the country—has been laid upon the preparation for men going to college, while there are only ten per cent. or less in the community in South Kingstown who have studied French and other kindred languages who ever can or who ever will go to college. Those boys are going out on the farm with no knowledge of breeding and no knowledge of the chemistry of fertilizing. It is a deplorable condition and places this country far behind the European countries, and as the last speaker has said, it is possible for us to have what we want here. We are talking about being behind the other States and having done nothing. Now, the history of this State has shown, if we want to do anything the State must lend a hand to the town, and the resolution I would like to put before the meeting is this:

*Whereas,* Rhode Island has taken as yet no definite steps to secure the introduction of courses in agriculture into the high schools in the State;

*Therefore, be it Resolved,* that this institute endorses the passage by the General Assembly of an act making an appropriation for such instruction in the several high schools in those cities and towns which will meet a definite part of the expense thereof.

(The motion after being read by the chairman to the institute, was unanimously adopted).

*By the Chairman.*—It is usual for people to make some remarks upon the subjects presented to them at these meetings. Some persons may desire to know more than they already know in relation to them, or they may have formed adverse opinions in regard to them. If there are any who have done so, we would like to know that. If you have nothing further to say on the subject, we will go on with the programme.

(At this point a solo was sung by Mr. Louis G. K. Clarner.)

*By the Chairman.*—Ladies and gentlemen, some few hundred years ago, there was an old college song called "The King shall come to his Own." I think that song might be verified again with the "Farmer shall come to his own." I am very glad to see so large an attendance as there is here this afternoon taking such an interest in this matter. I am reminded of the French proverb: "Audacité, audacité, encore audacité"—Audacity, audacity, again audacity. Let us persist in being heard. Let us insist upon measures being passed to help the farmer. We have our rights. We belong to the land. We own the land. We own the wealth that comes from the land, and our voices should be heard in any measure for town or State which bears upon the land. I thank you for the attention you have given here, and trust you will go to your homes and ponder over what you have heard.

## FEBRUARY 9TH—EVENING SESSION, 7:30.

### JUDGE JOHN W. SWEENEY, PRESIDING.

*By the Chairman*—Ladies and gentlemen, the meeting will now come to order. Things are not always what they seem; and even though the clock points about ten minutes of eight, it is not as late as that. We have given ten minutes leeway for people to get to the hall. It is now twenty minutes of eight instead of ten minutes of eight, and the point of this remark you may find later on, when the clock points at half-past nine or ten, and you are expected to take a train, then you will remember that according to the clock you have ten minutes more. There is a large attendance of people here, even in spite of the rather inclement weather, and that shows that we are taking an interest in the great work that the State Board of Agriculture has undertaken in this good little State of ours, in having these institutes, commonly known as Farmers' Institutes, which are really for the education and enlightenment of all persons who are interested in agriculture and its pursuits. We are all interested in the progress and in the products derived from agriculture. Of course, we all know that agriculture is the basis of all prosperity. Without agriculture, man could not exist. The products of agriculture are what give us everything that life is worth living for. Without them we would not be able to live and enjoy the beauties of the world. The last report of the great secretary of agriculture, of this great country of ours, to the government, showed that the products of agriculture for the year 1909 amounted to seven hundred and sixty millions of dollars, with the addition of eight billions of dollars worth upon top of that. We do not know what figures so vast mean. Of course, this covers all the products from agriculture, and to-night we shall be told by gentlemen who have had great experience in certain lines of agriculture, namely the poultry and hen business,—they will tell us, in their very entertaining and instructive way, of this branch of business. Before I touch on that, I wish to say one thing in furtherance of what was said this afternoon. We had a very able address by President Edwards, of the Rhode Island State College, and it is a pity that every person in this State did not have the opportunity of hearing it. I hope we shall have the privilege of reading his address either in the newspaper or in a report to be made of this institute,—and it was stated that the farmers are coming to their own. We people in Rhode Island, and other people in New England, have not given sufficient attention to the subject of agriculture. We have been taught in our public schools that Rhode Island especially is a manufacturing State, and yet if you will travel from one end of this State to the other, and go across it, you will find and you will see as good soil and as fertile fields as can be found in any place in the United States. Take the Island of Aquidnick, commonly called Rhode Island and Newport, and where will you find better land than is found upon that island? Also in the northern part of the State, and in the southern part of the State, all through this State, there is land which if properly worked, worked in an intelligent manner, can be made equal to any land, with the additional fact that we are close to the best market for the produce, where we would not be obliged to take the small amount of money for the produce that is given to the farmers of the west, and in addition to that the great cost of the articles that the western farmers produce which is taken up by the middlemen, and by the railroads in transportation. Here we are near the city of Providence. The last census of population showed that the city of Providence had 185,000 and they claim now that it has over 200,000. Pawtucket, Central Falls, Woonsocket, Newport, and all the thriving villages near here, are great markets for all the produce that can be raised upon our fields, and its seems to me that a mistake has been made in farmers trying to cultivate too large an area when they should consider that if they have a little farm, well tilled, and practice intensive farming rather than extensive, if they have not the capital to do it, that they would be better off at the end of the year. Now, one way to practice intensive farming, in one of its branches, is by keeping poultry, and, as I have stated before, we have gentlemen here who will be able to tell you about the poultry businees and the profits to be derived therefrom.

The first speaker of the evening is a gentleman who has had more than twenty-five years' experience in the business. He is the originator of the breed of hens commonly known as the white Plymouth Rock. He comes from Wellesley, Massachusetts. Now I have pleasure in introducing to you the Hon. Abel F. Stevens.

## PRACTICAL POULTRY CULTURE.

BY ABEL F. STEVENS, WELLESLEY, MASS.

Of all the leading industries of rural life, there is none so interesting, so pleasant, or so profitable as that of poultry raising. The universal interest taken to-day in this branch of agriculture speaks of its importance as a great factor in our national wealth, for when we compare the most carefully complied statistics that can be found, we are astonished at the magnitude of the figures—for we find that the combined products of eggs and poultry as an article of food, from a commercial standpoint alone, amounts to the enormous sum of $700,000,000; now when we add to this the number of live birds, 500,000,000, with an average of $1.00 per head, it makes the sum of $500,000,000 plus $700,000,000 for eggs and dressed poultry, amount to $1,200,000,000; surely we can say poultry is king.

If we look into the egg trade for a moment, we find to supply the active demands of our people for this prime article of food, besides all that are produced in this country, we are compelled to import from Canada and Europe, the past year, 34,000,000 dozen eggs, and for the last decade we have paid out, for imported eggs, $38,000.00; besides we import thousands of tons of dressed poultry from Canada and Columbia. Now all of these immense sums of money should never be allowed to leave our own fair land to provide these articles of food, when all of it can, and should be, produced by ourselves. In the future of our nation, let it be done; for there is no other nation in the world that can begin to compare with us in the production of the food products, either in cheapness or in such quantities or the varieties that are grown over so large an area as in this country, of the very essentials and requisite food, the different cereals, nature's true food for poultry; in fact, we produce the grain *here* that is exported to Europe, to there produce the eggs that *we import* to feed our own people. This should not be so where we have so many enterprising American farmers. As an article of food, the production of the poultry yard is the very best in the world, taken from any standpoint; for, while it is true that the largest part of this product is consumed at home, as it should be, for both the eggs and flesh of poultry are foods of the most nutritious and valuable kinds, and if their consumption was increased ten-fold in each of our families it would be a blessing in the increased health it would bring. My friends, have some of these nice things; if you cannot have the handsomest fowls, then have the finest eggs.

## EGGS AS FOOD

Are among the best and most nutritious articles of diet known to man. Like milk, an *egg* is a complete food in itself, containing everything necessary for the full development of a perfect animal, as is manifest from the fact that a full developed chick is formed from it. This is a great mystery,—how muscles, bones, feathers, and everything that a chicken requires for its perfect development are made from the yolk and white of an egg. But such is the fact, and it shows how complete an egg is. There is no more concentrated and nourishing food than eggs, the elements of its composition, such as saline matter, albumen yolk, etc., one as in milk, in the right proportion, for sustaining animal life. Nice fresh eggs properly cooked, and they can be served in a variety of ways, is food fit for a king.

What is an egg? The shell is composed of carbonate of lime, while the egg itself is very largely albumen, with oil, sulphur-iron phosphorous, and coloring matter. A good-sized egg weighs 2 ounces, and is composed as follows—64 parts water; 15 albumen; 11 oil and salts; 10 lime of the shell. Albumen is composed of nitrogen, and the purest form of true albuminoids in nature is the white of an egg. Its elements, like milk, are in the right proportion for sustaining animal life, and the value of 8 eggs equals one pound of beef. An egg contains 15 per cent. of carbon and 2 per cent. of nitrogen, and the value of one pound of eggs is to one pound of meat as sixteen is to nine, as food for sustaining the active forces of the body. The first step in poultry farming begins with the egg, for all animal life has its beginning in the egg. In the large mammals the egg is hatched within the body of its mother, while in the gallinaceous and most other orders of animals the egg, after being charged with a supply of nutriment sufficient to carry its inhabitant to a stage of growth, is removed from the body and the life within it awakened, or it is destroyed by the circumstances with which it is surrounded. In addition to the chemical elements which constitute the oil of the yolk and white of the albumen and lime of the shell, they contain the life germ of the future *chick*. This is a circular speck seen on the top of the yolk, and is constantly in this position by the laws of gravity, it being lighter than the rest of the egg. Directly opposite this germ speck is a dense mass of albumen, which serves to keep the germ uppermost on whichever side the egg may be placed. By this arrangement the germ is kept constantly near the breast of the mother, and in such a position as to receive the warmth of the hen and to avoid injury to the growing embryo chick, which would result from the pressure of the heavy mass of yolk. A most wonderful provision of nature.

When fertile eggs are placed in a continuous heat of 103 and four degrees, in about thirty hours the germ will begin to increase in size, and minute blood vessels may be seen forming a beautiful network around it, and gradually during the four days of incubation, when the full-developed chick appears. This wonderful egg is thus seen to contain every element, except oxygen, necessary for the formation of the living chicken—the flesh, blood, and bones, the horn of the beak, nails, and quills, the plume of the feather, the various internal organs, and the digestive fluids of the body. In the process of incubation, whether natural or artificial, we should follow nature, as shown in the instinct of the mother hen in providing proper conditions. If you only desire a limited number of chicks annually, and not early hatched ones,—why, select good steady sitting hens; but if you desire very early ones, by all means get a first-class incubator, and hatch at your pleasure. Remember it is not the method of hatching, but the after-care given the chicks, that makes the difference between the two systems. A first-class brooder must be provided to have in readiness to receive them at 95 per cent. heat, for all depends on the good care and proper feed the young chicks receive at the very start. By that wonderful provision of nature, food enough is stored up in the egg from which the chick was hatched to sustain it for the first twenty-four hours. Keep your brooders scrupulously clean, feed your chicks every two hours, and keep clean water before them all the time, never let their drinking-dishes become foul and tainted, keep a dish of scraps before your chickens all the time after a week old. If you do not raise in large quantities, I should certainly feed johnnycake (one-third middlings, one-third ground oats, one-third Indian meal, teaspoonful of saleratus, bake hard); but in raising a large number, we feed for one month, Cyphers' chicken food, then cracked corn and cracked wheat. Always keep lots of green food before them. Shelter from sun and rain-storms. At twelve weeks separate the males from the pullets and feed the pullets on good wheat, green art bone, and barley oats, to induce early laying; and the cockerels on corn meal, whole corn, and animal meal, for size and flesh.

### CHICKEN'S LAMENT.

"I'm a poor boycotted chicken,
That the rest are always pickin',
For at me they always seem to be amused.
And I think about my life,
With its trials and its strife,
And I feel I have been very much abused.

"My owner's wife's a sharp one;
She was constantly a harpin':
'Let us raise some broilers, broilers, broilers, Sam.'
She called the old hens lazy,
And she made the poor man crazy,
So he brought the things that made me what I am.

"Hatched by heartless incubator,
Fed on onion and potater,
And crowded 'till we couldn't sneeze,
I and fifty lettle brothers,
Lay and sweltered, lay and smothered,
Tho' we begged for air upon our bended knees.

"But the crowd was quickly lessened,
As you no doubt can guess, and
Soon our numbers were reduced to three;
Then a rat took one dear brother,
And a board fell on the other,
Which left that fatal brooder all to me.

"And now the night is falling,
And I hear the mothers' calling
To their chicks that seem as happy as a king.
I crawl beneath my cover,
But it will not, cannot, hover,
And I cannot tuck my head beneath its wing.

"So, uneasy and forsaken
I lie 'twixt sleep and wakin',
And sadly dream about the 'might have been;'
How, beloved by many dozens
Of admiring aunts and cousins,
I might have been, if hatched by mother hen.

"So that box I call my mater,
Makes me feel my need the greater,
Makes me long to join the loved ones gone before.
And it need not take a wizzard
To show that, soul and gizzard,
I shall happier be upon that thronged shore."

We come now to the *practical* management of our breeding stock. First of all secure good healthy vigorous birds, mate up carefully with a view of the object to which you are aiming, for successful results. Always let *individual* excellence be *paramount*, as well as general good qualities in your foundation stock, let your *hens* be few in number, but excellent in quality; select those varieties that are best adapted for the purpose for which you are breeding. Have your poultry houses on good dry soil, and well-aired daily; feed liberally of the best quality of food; don't you use damaged grain, or allow your birds to drink impure water; keep everything clean and sweet; semi-annually, lime-wash the interior of your house, use a little carbolic acid in it; put kerosene oil on all your roosts weekly. Sprinkle some good insecticide over and under all roosts, nests, etc.; never let any vermin prey on the vitality of your birds. Keep them from all damp, cold drafts of air; keep warm and dry. These are the secrets of success in poultry culture.

Hatch your chickens in March or April. Keep them growing by feeding as we have directed, so the pullets will lay by October or November and continue throughout the entire winter and spring, and keep them at it by judicious system of feeding, which we now give.

This is our best *bill of fare:* from a chemical analysis of the various kind of food we find that the constituents of the egg are found in proper proportions in milk, wheat, oats, lean meat, and vegetables. The best winter feed for eggs, green cut bone, cabbage, cut clover, steamed over night and feed with bran, for morning mash; scatter barley or wheat in litter for noonday meal; for night, two-thirds wheat, one-third corn. I will give you a morning feed for laying hens, as follows: 100 pounds corn meal, 100 pounds ground oats, 200 pounds wheat bran, 50 pounds meat meal, 25 pounds linseed meal, 25 pounds cooked vegetables, making 500 pounds; mix and scald, feed one quart to eight hens. The best winter food; if this can be mixed with milk, it will greatly increase the egg production. Let this be their daily morning feed. A scratching-shed where you scatter at noon a light feed of wheat, barley, or buckwheat in their litter, will make them take the needed exercise. Whole corn at night is good for them as food. Give your hens pure water to drink; never let them have snow water, it causes bowel trouble on account of the mineral it contains.

In breeding we always get the type or style of the bird, the strong colors of plumage, and the fine points, as of comb, from the sire, while from the female we get increased size, general form, etc. Remember in breeding, that the strong characteristics of a family are always reproduced in every third generation.

Now, my friends, with these practical suggestions, strive to improve your poultry, for perfection has never been reached. We consider the best birds for *business*, R. I. Reds, Wyandotte, Plymouth Rock, Leghorns. In color, first, white; second, buff; third, blue; or—be patriotic,—Red, White, and Blue. We consider the best for poultry, three varieties: R. I. Reds, White Wyandotte, or Plymouth Rocks and Buff Rocks, all are excellent for eggs and poultry.

The famous R. I. Reds are celebrated for their dressed poultry and production of eggs. They are very hardy, mature early, lay at six months large pink-tinted, thick-shelled eggs; as poultry they dress plump and firm, shapely bodies, very full breast and thighs, meat of bright color, golden yellow, and of the finest quality; their attractive color, quiet habits, make them the ideal breed for the poultry farm.

Always keep pure bred stock of that color and that breed that you like the best, as you will take better care and more pride in owning and raising such. The best is none too good; select with care, feed with judgment. Exhibit your birds, and thus advertise your stock. All that is needed for successful poultry farming is common sense, patience, work, and a little capital.

### A FEW DONT'S.

Don't try to create a new breed.
Don't set hens' eggs over three weeks old.
Don't set eggs too large or too small.
Don't forget the best hatches are in March, April, and May.
Don't forget that cleanliness is next to godliness.
Don't let the chicks out when dew is on the grass.
Don't help chicks out of the shell.
Don't forget shade.
Don't throw away your onion tops.
Don't set a hen twice in succession.

With these hints, there is no reason why you should fail in poultry farming.

*By the Chairman.*—If any person wishes to ask any questions of the speaker, he will be very glad to answer your questions, or, if you are a little diffident about asking questions, if you will write them out and put them in the question-box at the door, they will be answered before the close of the meeting to-night.

*Mr. Stevens.*—In regard to the question-box: When I am down in the old nutmeg State, I say, "Let George do it," and he does it. When I am in Rhode Island, I say, "Let Dan do it," and Dan does it.

*By the Chairman.*—I am not saying who will answer the questions, but they will be answered before the meeting closes. We have experts present, who can answer most any practical question that can be asked by any inquirer.

(At this point Mr. Louis G. K. Clarner sang a solo.)

*By the Chairman.*—You have heard from Massachusetts, and, of course, our next turn would be to hear from our adjoining State, that of Connecticut. Years ago, a gentleman residing in the city, his health was not of the best, and he felt the yearning for the country which comes to most of us, so more than forty years ago he moved out into the country, and he has spent those years following the line of hens and their products. He has arrived now at more than three score years and ten, and we are hoping that his years and usefulness in the future will be many. I have pleasure in presenting to you Mr. George A. Cosgrove, of Wilmington, Connecticut, President of the Connecticut Poultry Association.

## ADDRESS OF MR. GEORGE A. COSGROVE.

Mr. President, ladies and gentlemen, one of the statements of our presiding officer was a little wrong. I lived in the city till I was some fifty-seven years old, and I have only been out on the farm but fifteen years instead of forty years.

Now, one of the funny things about the poultry business is the contrary experience different people have. The last speaker spoke about "the marvellous instincts of the hen." Now, I have had hens whose marvellous instinct led her to kill every chicken just as soon as it was hatched out of the egg.

*Mr. Stevens.*—You didn't have the right kind, brother.

*Mr. Cosgrove.*—I don't know what it was if it was not some "marvellous instinct." Then the previous speaker spoke also about "the instinct of the hen leading her to turn the eggs over once a day." Well, I remember several years ago I had a hen sitting, and I never could look into the coop but that the old beast was standing up in the nest turning over the eggs. I don't know whether she got up in the night to do it, but notwithstanding, she got a good hatch. Now-a-days, we come to the conclusion that the eggs ought to be turned over more frequently than has been the custom. We have been used to turning over incubator eggs twice a day. Now they think it is of advantage to turn them over three or four times a day. I don't know whether it is or not, and I can't speak from much experience on that point. I have used the hens to hatch eggs as much as possible, because many people have the idea that the vitality of the chick is better, if it is hatched under a hen, than it is if it is hatched in an incubator. Mr. J. L. Nix, President of the Prairie State Incubator

Company, a year ago, at our annual meeting of the Connecticut Poultry Association, delivered an address, and he stated that as a fact. Now, just think of that; a manufacturer, making and selling incubators for his living, stands up before an audience and tells what he thinks is the honest truth to the detriment of his own business. That is the kind of a man to look to. I told him that if Diogenes was round here now, he would not need any lantern to find an honest man. He said that the lack of vitality could be overcome by using males that were hatched by hens. Some breeders claim that the chicks are as well hatched in an incubator, and are just as strong and full of vitality, as far as they see. But it didn't seem to me as if Mr. Nix, with all his years of experience, would have made such a statement against his own business interests unless there was something in it.

Now, he said this artificial hatching which has been conducted for centuries in Egypt especially, if that artificial hatching had resulted in a loss of vitality, there would not be any vitality in the chicks at all by this time, and they could not raise any. But they have been raising chicks, artificially, for thousands of years. A man goes in the oven and stays there during the entire hatching, and when the heat goes down they build a small fire of straw and stuff right in the oven. Where that is done, they do not have any thermometer to tell what the degree of heat is. They put in the eggs and, by the touch, by the feeling, they could tell whether the heat was right or not; and he says that when one of the fellheen—that is, the farmer, the laborer of that country—brings in his eggs to be hatched, they give him seventy-five per cent. of the number of the eggs in chicks, and they depend for their profit on what they can raise in addition to the seventy-five per cent. In this country we think ourselves mighty lucky if we can raise seventy-five per cent., or hatch them.

Now, I want to say a few words about how things are in this country. I go along a country road sometimes and I see a farmer's poultry house up nine feet high in front, a long slope down, six feet high in the rear, and he has twenty-five or thirty hens in there. You go in that farmer's barn, where his cows are,—about six feet high,—just room enough to clear your head, just about room enough to get past the cows to feed them. The rule which is followed in building a cow barn is one cubic foot of air space for each pound of flesh. A thousand-pound cow requires a thousand cubic feet of air space. Now, look how it is about the hens. Suppose his coop is ten feet square on the ground; that is, one hundred square feet of floor space. He puts twenty-five hens in there, weighing four pounds apiece; that is one hundred pounds of hen flesh. If he constructed that poultry house just the same as he does his cow barn, his house would only have to be one foot high to give each hen a cubic foot of air space for each pound of flesh that was in there. Now, do you find poultry houses anywhere one foot high? Why, the Humane Society would get after the man who stabled a cow in a place as big as a church. It would freeze to death. But that is just exactly what most of them do with their hens, and they wounder why they don't get any eggs all winter. I think the houses can be built low. I think there is no subject in connection with keeping hens that needs to be looked into more than this. Mr. Robinson, editor of Farm Poultry, a few months ago, in one of his magazines, had an article in relation to the small house that he had, which was only about two feet high on the side, and three feet high where the roof ran up to a peak. He had built it for little chickens alone. Towards the fall, some of the old hens went in that coop, and stayed there all winter; and his hired man and boy said that that was the best house on the place, and that they got better results from that than any other of their big, tall hen houses, because there was air space small enough there so that the warmth of the bodies of the hens made it more comfortable for them. I believe it is a point that needs looking into. I believe we have built our hen houses too large for the quantity of fowls that we confine in them. But they are doing marvellous things now-a-days. They are knocking over all preconceived ideas. We used to think that the rule was that at least four or five feet of floor space was required for each hen, and here are the Cornings now out with a new book claiming to have made $6.41 from each hen for the year, and they claim they made $12,000 and over, last year, and they have fifteen hundred in one house, a house of 160 feet long and 16 feet wide, which gives them 1.7 feet of floor space per bird. Their house is built up five feet above the ground with openings so that the hens can go down to the ground floor under. They keep the hens right in that building ten months, and they don't go out at all, for there are no yards. They can go down to the ground, but practically very few of them do go down. Nearly all of them stay up there where the litter is. There are no male birds in there. Fifteen hundred in one house; no partitions except about a foot further than the edge of the dropping-boards, one every 20 feet, so as to prevent draughts in the house. Thus each hen has the whole 160 feet to run it, and they get marvellous results. But it is partly, I think it is mainly, from the way they feed them. They take green cut bone, mix that with grain, two or three kinds of grain, and they have got a mixing machine with steel arms. The grain is thoroughly mixed with the ground bone and meat, the gristle that adheres to the bone, and there is moisture enough to wet that all up with the juices of the meat and bone. That is fed once a day. That is a powerful egg-producing food. Then, of course, they have dry grain twice a day in addition, and plenty of water. There are some curious things about this hen business, things that theoretically ought not to be, but the hens don't act that way. For instance, the previous speaker made a strong claim that you ought to have pure water. Well, now, it is a fact that if you get a pail of pure water, set it on the ground, and there is a mud-puddle right next to it, the hens will drink out of that mud-puddle ninety-nine times out of a hundred.

I was out in Barrington, Saturday, at a farmer's, and stayed there over night. He was a hen man, who makes a business of the poultry keeping. He told me that when his boys clean out the drinking-fountain, there is always some water spilled down on the ground, and the hens will eat every bit of that wet ground they can get hold of. They dig holes right round where the fountain is, in eating the wet earth. They will dig up every bit of this moisture. I have seen them do it hundreds of times myself. I presume the reason is this: If we, in eating our food, get a particle of grit in the mouth, the sensation is so disgusting that we have to spit it out. With the hen it is just exactly the opposite. She needs the grit. She likes the sensation of the grit. She eats that earth. She can swallow that easier than dry earth. The sensation of that grit going down her throat is pleasant to her. Years and years ago—oh, I am awful old, you know—years and years ago, down in Whitneyville, Connecticut, I used to raise young chicks, before incubators and things of that kind were known. We had no artificial brooders and things of that sort in those days, but for the first week I kept them in the house, after they were hatched in a little box and they could run about in it. I put white sand at the bottom of the box, and some of those little fellows would load themselves with that grit, so that they became solid and stuffed with the grit, and when I squeezed them a little, some of the grit would come out of the vent. That is a solid fact. They were just absolutely filled full of sand. Now, we read something about the Philo system; that is, raising young chicks without artificial heat, making a cluster of chicks furnish their own heat by putting enough of them together.

I was going to say that I had done that forty years ago. In those days when we didn't have any incubators, we used to set hens two or three times in succession, and because we wanted to make the most of them we could not waste their time in taking care of the chickens, so we had to set them over again. I have even set them over three times in succession, if the hen was in reasonably good condition. If she was poor and pale, I would have mercy on her; but if they were in reasonable condition, I used to set them over three times in succession. Then what are you going to do with the chicks in cold weather? Alongside of our barn we had a cold frame with glass on the top, and at one end I put a box, and I tacked in the top of that box a lot of woolen rags and used it as a mother for the chicks. The chicks would come in that box, and the warmth of their bodies would keep them warm. I never had in my life a chick grow faster, be more vigorous or stronger, than those chicks in those early days, hatched without any artificial heat. We didn't have any brooder of any kind. We kept them in the house, as I said, the first week, then put them out in this little place until they would weigh a pound or so, then put them out in little runs and let them run.

Now, I want to say another thing. At that time I was working in the Whitney armory, making guns and pistols. That was the time of the civil war. There was another fellow to shoot them off. I was only making them. I rented a place there, of eight acres. It was a gentleman's summer residence. There was a good-sized barn there. There was a glass hen house in this place. We thought we had to have lots of glass in those days. This was glass on three sides, and a glass cupola on top. It cost three or four hundred dollars to build. There was a long shed from that to the barn. I thought that hen house ought to be utilized, so I stopped a farmer going by on the road, and bought a half a dozen little hens of him, little yellow things weighing about three pounds apiece. Right across the street was a chicken fancier, and secretary to the Whitney Arms Company. He had some Partridge Cochins, great big fellows, and I asked him to let me take one of his roosters. He was very glad to. In the fall I had seventy-five beautiful big brown pullets, very fine in color, weighing six to seven pounds apiece. They were beauties. I started in, the first of January, to see what I could make out of them—to know what I was doing. I kept a rigid account. I charged them with every pound of nails, or anything I used around the poultry department, as well as the food, and I deducted all the eggs set for hatching, and at the end of the year I had $154 in clean cash profit from the seventy-five hens. The rent of the place was only $150, so that the chicken coop paid the rent and four dollars over. I worked ten hours a day in the factory.

To show that there is something in "the man behind the gun," three years before that (I didn't know anything about it at the time) a retired sea captain had come to this same place and began to keep poultry. He didn't know a thing about chickens and poultry. He didn't know how to set the hens. He had to ask the neighbors how to set the hens. After awhile his chickens got lousy. They got so they didn't lay, and he paid out more for food than the eggs brought in. He didn't know what the matter was. He had nothing else to do but attend to them all day long, for six months. Then got out of that business a sadder, a poorer, but a wiser man than went in. Now, you see, I went right in that same place, worked ten hours a day in the factory, and made my hens pay over two dollars apiece profit. So you see there is something in knowing how, or at least having a sort of inkling as to how, to do it.

In 1893, the panic year, I came out into the country and bought a farm. I was all broken down in health. I didn't expect to live five years. I didn't know a thing about farming at all. None of us did. The family consisted of wife, and two granddaughters and myself; no boys to help. None of us had ever milked a cow. I never had plowed, or swung a scythe. I had the whole thing to learn. We started in with cows, but after a couple years—less than that time—I found that poultry was paying a good deal more than cows on the same investment of capital, so we gradually increased the poultry, and now, for the last twelve years at least, the poultry has been the sole means of support, as you might say, of myself and family. I have made a good living and a little more, and regained my health, and now, after fifteen years, there are days when it seems to me that I am good for ten more; in fact, I have agreed to. Professor Stoneburn said he wanted to enjoy my company ten years more, and I agreed to let him do it. In speaking about hatching chickens, one of the important things to see to is that they should be well hatched. I have absolutely ruined a lot of chickens in the hatching. Professor James E. Rice, of Cornell University, one of the best poultrymen in the United States, lays great stress on vigorous stock. He published a bulletin of pictures of vigorous birds, and weak birds. He is perfectly right. But you can take the most vigorous stock and absolutely ruin them in the hatching, so that the chickens will not be any good, and you are in good luck if they all die. I have done it myself, and I have done it by cooling the eggs. I was selling eggs to a man in Massachusetts. He was getting better results from the eggs than I could at home. I asked him about how he did it. He said he was a fresh-air crank. He began to give them ten minutes of air the fourth or fifth day, and kept increasing the time until, day or two before hatching, he was giving them two or three hours' air. I don't know where he kept his incubator. I didn't have mine where I ought to. I had them down in the cellar. I put a thermometer on the eggs. I didn't let them go below seventy degrees, but could not keep them out as long as he did, but it would take two or three hours before the heat would get up to 103 again, and the result of that was that I had only one chicken hatch the 21st day, six, eight, or ten next day, ten to fifteen next day, and so on. They ought to have hatched on Monday, and they were still hatching Saturday—hatching the whole week. I put them into a brooder. Every day there would be six, eight, or ten dead ones to take out. They didn't seem to have any vigor, or care much whether they lived or not. In next brooder to them had some chickens hatched in the same incubator, eggs from the same stock, and they were a hustling, lively, vigorous lot. You could hardly realize the difference between the two. I remember one day I had omitted to feed them at the regular time. Something had kept me away. I came into the brood house and they heard me. They rushed down from the brooder, down the incline into their little yard, and when I came in sight they were lined up in rows, right across their yard, and every neck stretched to the limit, every one yelling to the top of their voices. I never got such a tongue lashing in my life. I rushed for the feed-box and threw down some feed. And then what a change in the sound—I don't think there is any sound in nature so charming as the noise little chicks make when they are eating, just as though they said, "Thank you, thank you," with each grain. They stop making that noise when they get a little older. I don't know just when they do stop, but I don't know of any sound more charming. I don't know of any business so nice as to take care of little chickens. It don't make any difference how much of a hurry I am in, when I go in where the little chicks are I sit down and play with them a little while anyhow. You can't help it. It is just fun. It is not work at all. It is just fun.

Now, I want to say a word about the character of the fowls. That will make some men laugh, who don't know much about chickens. There is as much difference in their characters as in yours. They have all kind of characters. I have a big rooster I got from Andrews . . . of Massachusetts, and that bird was a gentleman in looks, in character, in action, in manner, and everything. When Professor Stoneburn, head of the poultry department of Storr's College, came to my yard, the first thing he said was, "That bird has got brains." I had another big-boned, heavy rooster, that was a bully and a brute. It showed it in his manner, in his actions, in everything he did. He was vigorous and strong, but when you went out of the yard you had to keep your eye on him or whack he would go at you, and you were liable to get hurt. Everything about him showed the bully. He walked around the yard with one shoulder a little lower than the other. Now, I had a pullet I raised, which was just the opposite; a Leghorn—that was in the civil war days. I mated some Dominique Leghorns, and had one pullet come out jet black. That pullet was the most ladylike hen I ever saw. I can tell you what is literally true. I was sitting on my doorstep one day, and there had been a shower. There was a little pool of water that an ordinary hen would run right through without paying attention to it at all. I saw that pullet just lift her wings and pass around it, and the action irresistibly suggested to the mind a fine lady raising her skirts, and that pullet did put me in mind of a refined lady in all her action. I tell you there is much fun in the chicken business if you once get into it and get so you know the difference. I go out in the fields and see a lot of sheep. They all look exactly alike to me. I can not tell one from another. The shepard sees the individuality and character of every one of them. To him there are no two alike. It is all training, There are a lot of things that we go through life and do not see at all, even though they are right before our eyes.

Now, in building houses I like an earth floor. I will tell you how I fix mine. I go where I have raised potatoes—there is earth that has been dug up and is dry—and in digging there I throw the earth into the sifter and shake that into the wagon and throw the stones outside until I get a wagonload of sifted loam, and I put from one to three loads in each poultry house, after cleaning out all the dirt and stuff. In that way, you see, I have practically removed my coop to a new location. That soil is a dust-bath for the hens for all winter. There is not a day in winter I can't dig down inside the houses. In the hen house I also have a chestnut board sunk into the ground just inside the house. That keeps the frost out a great deal. Loam is sifted all over the droppings-boards, and when the droppings of the birds are scraped off it is in much better shape to use for vegetables or grassland than if it was just clear droppings alone, because that will burn the roots of tender plants. I think it is much better than sand or gravel. The loam makes an objectionable dust. I often had to blow the dust off the eggs before I put them in the basket. I thought I would get rid of that, and I sifted some gravel and put that into one of my houses, and in another house I put some fine sand. I found neither one is half as good as a sifted loam. The sand is cold to their feet. They won't wallow in it at all. They won't use it for a dust-bath at all. From my experience I should say that sifted loam is far preferable every way. I like it much better than a board flooring. If you put a board floor in the house, it is all right if you keep six or eight inches of earth on top. After a while, it gets worked down and the droppings begin to stick fast on the floor, and by and by you have got a foul-smelling poultry house.

Now, as to the location of the poultry plant. I happen to be lucky in that respect. Where I put my poultry plant the ground was high, with a long slope to the south, a slope to the east, and another slope to the west. It was a shaly, gravelly, soil, very little loam to it. Now, after twelve years of continuous use, going into the hen yard, I don't find any indication that there have been hens there. Every rain washes that ground all off. If that ground had been on a level and loamy soil, the droppings would contaminate the soil so that it would have been impossible to keep hens there years ago. One of the main reasons why people fail, after starting a poultry plant, is because of the sickness and diseases that get into the flock from contamination of the soil. That is one of the principal things to be seen to in locating the poultry plant. Now, I have two acres, fenced round with a six-foot fence, for my young chicks to grow in. I plant a strip of corn there, for shade and shelter, about 50 feet wide and 300 feet long. That is a place to run into as a shelter from the sun, and it is a delight to them. On that piece of a little more than one-third of an acre I had eighty-seven bushels of corn two years ago. Last year was awful dry, and I did not have so much—about sixty bushels—but the way I happened to get so much is this. After it was plowed I set two boys to mark it out. They put the plow right down about six inches deep instead of two or three, but after it was all done I was not going to harrow it over, so I planted corn down at the intersection. When it was covered it was about two or three inches below the surface, then the first cultivation rolled enough earth down there so it didn't need the hoe at all, and then afterwards made it level; and all summer long, in a dry summer, when my neighbor's corn was all shrivelled, there was scarcely a blade on that piece that was wrinkled or twisted at all. It was all down in the soil where it was moist, and it gave good results.

One of the things we have to look after in the poultry business, especially in the fall when you have got a lot of young chickens coming on that weigh three or four pounds apiece, and you have got plenty of house room for them, they may abandon their house and crowd into one coop. Sometimes two or three lots will crowd into the same coop; and then if there happens to be a change in the weather, and a cold rain comes up, and they go out of the warm coop into the cold rain, they get cold. Now, the man who does not know anything about poultry does not notice the wet nostrils of the chicks; he throws down the feed as usual, and goes off to his business. Just there is where he makes his mistake. It is a very easy matter to cure them of that cold; but if he lets it go on it is liable to turn to roup, and when a chicken that has got the roup goes to drink it makes a little scum on the water, and the next one that drinks is liable to have the roup, and so on until it gets through your flock, and your year's work is practically ruined. It is difficult to cure a real hard case of roup, and in most cases after they are cured a chicken is not worth much. If you take permanganate of potash and put in about a level teaspoonful in a twelve-quart pail of water, it will color the water a rich wine color. Do that every day for a couple of weeks. It will dry up all that moisture and cure those colds. I had to do it last fall myself, and I notice they had to do it down at Storr's College. It has got to be done where you keep a lot of poultry. It is quite a necessary thing to do.

Now, we all want fertile eggs. When you are going to set hens, in spring, what are the conditions that produce fertile eggs? They are most fertile after the frost has gotten out of the ground and the worms have come up and the green grass started. That gives them plenty of meat and green food. I get my green food in this way: I save my rowen hay—cured as little as possible—run it through a hay-cutter, and make half the bulk of my wet mash consist of this cut hay with skimmed milk, warm, and mix in bran, middlings, and a little corn meal, with beef scraps, to make a bulky food. A good many poultry fail in not feeding enough bulky food. This cut grass is run through my food-cutter before I put in this sort of food. It is short, about two inches. It ought to be about half as long as that, but two inches will not do any hurt. When the hen eats that, she gets her crop full, and she has a very comfortable sensation, similar to what any one of us may have when we have had a good meal. I think that where we feed concentrated food, just simply grain food alone, and not enough bulky feed, we lose by it, and our eggs are not as fertile. The hens are not in as healthy a condition. I don't think they lay as many eggs, and it is clear to me it is a good, wise thing to do to feed bulky food. If they do not get bulky food enough, they are liable to eat up the litter in the poultry house, and cases are known where they eat their own droppings to fill up with, and it is sometimes found in their crops; and they are in a fatter and better condition than the hens that don't feed that way, so that we do need to feed some bulky food.

*Question.*—You want to caution them about the quantity of permanganate of potash. It is a poison, you know.

*Mr. Cosgrove.*—You put a level teaspoonful of permanganate of potash in a twelve-quart pail of water. That won't do any harm at all, but you don't want to put in a handful. Perhaps you would like to ask some questions, if so, I will try to answer them.

*Question.*—What time do you feed your mash?

*Mr. Cosgrove.*—At noontime. I feed grain in the morning. I have oats, barley, cracked corn, wheat screenings mixed together. I like to feed mixed grain. I have noticed in my poultry house, if I fed a little too much in the trough at night the corn will be left and the wet screenings are sometimes left; so my hens, I am satisfied, can balance their own rations better than I can. If I give them mixed food, they can pick whatever they want to eat in a day. If a hen is too fat, she will leave the corn and eat something else. I put in the corn, and let her balance her own rations. I am not a chemist or a scientific farmer. I am just a plain old farmer, otherwise my habits are good.

*Question.*—How many hens do you keep?

*Mr. Cosgrove.*—I have got about 250 now. I used to have about 500, but for the last two or three years I have been breeding more on the fancy line. I have had so many calls for eggs and for stock for breeders, that I have been compelled to keep better and better stock, and to buy better stock. I keep White Wyandottes. That has been my specialty for a number of years. For eight or ten years I have written for the Rural New Yorker, occasionally, and they send to me for eggs. They see my name in there and the consequence is, I have been actually forced into the fancy business. I feel that a genuine chicken man can not be satisfied long with a lot of scrubs. He will have to get into the fancy line more or less.

*Question.*—How do you feed your young chickens?

*Mr. Cosgrove.*—I feed them according to the age. The first thing, I put some clean sand in the coop, and then I take the unfertile eggs from the incubator, save them for that purpose, boil them hard and chop them up very fine, then soak some dry bread and milk, squeeze it out as dry as I can, and drop that on the sand, purposely on the sand, so that when the chick picks that up some of the sand adheres to it and he gets some in his crop. I don't give any food for the first twenty-four or thirty hours, sometimes forty-eight hours, and after three or four days' feeding that, then I give them rolled oats and my wife makes johnny-cakes of corn meal,—I don't know just what she does put in the johnny-cakes, myself, but the chicks like it first rate.

*Question.*—Rhode Island or Massuchusetts johnny-cakes?

*Mr. Cosgrove.*—Neither. Connecticut johnny-cakes.

*Question.*—How have you found, by practical experience, the deposits in the hen houses—as to what sort of fertilizers they are adapted to?

*Mr. Cosgrove.*—I think there is not anything so good for grass, to put it on grass. My attention was first called to it, that is, as a fertilizer from hens on grassland, by going on a visit to a poultry man several miles from where I live. When I got ready to go away, he said, "Come, I want to show you some grassland." He pointed out to me a piece of grassland and I could easily see the difference between the two kinds of grasses. I says, "There is twice as much grass there as there is on the rest." "Twice," he said, "there is easily three times. There is three times as much where those hen droppings are than where there has not been any put on." And then, for corn it is also a great fertilizer.

*Question.*—Do you use it without mixture with anything else?

*Mr. Cosgrove.*—Without an admixture of anything. That crop that I had of eighty-seven bushels on the third of an acre didn't have a pound of commercial fertilizer or any other fertilizer except hen manure scattered in the trench.

*Question.*—What do you think of a cloth front as against glass?

*Mr. Cosgrove.*—It wants some glass. They want some light in there, but a cloth front answers all right. Where you can hook it up out of the way, and let the sunlight right in, it answers very well indeed. In fact, we have come now to usually conceive that it is better than a window would be of equal size in there.

*Question.*—But you can have them half and half, perhaps?

*Mr. Cosgrove.*—For the front, yes.

*Question.*—No; half glass and half cloth?

*Mr. Cosgrove.*—I should put some glass in for the sunshine, but the way I usually have it is two narrow windows so that the sunlight can strike from either way clear across the house. Of course, sunlight is a good germ destroyer, a great purifier.

*By the Chairman.*—If there are no further questions the lecture of Mr. Cosgrove will close, and we will be favored by a song from Mr. Linn.

(Mr. Linn sings a song).

*By the Chairman.*—The first speaker is a very versatile gentleman, I infer from his remarks, and he has gained notoriety in dairy keeping, as well as in poultry keeping. He will now entertain us by a recitation.

(Mr. Abel F. Stevens renders a recitation entitled "The Old Red Hen.")

*By the Chairman.*—This farmers' institute is for educational purposes, and it is the purpose and intent of the State Board of Agriculture to continue these meetings to-morrow. Very important subjects will be discussed in the morning and afternoon, and we have eminent men from Connecticut and Maine, as well as from our own State, to discuss the matter of the dairy and to make suggestions to our own people as to how to profit in that line of work. Of course, we are all proud of the fact that even in the State of Rhode Island we have had very valuable cows in the line of Guernseys. We rejoice that in the cow called Mussie of the Glen, in Mr. Taylor's herd, of Newport, we have Guernseys that stand at the head of the Guernseys of the United States, beating the record of Darley Dimple. In the afternoon we will also have an institute at which the principal subject for discussion will be the growing of corn. Of course, in the south they claim that cotton is king. In the north corn is king, especially in Rhode Island where we raise corn that makes the famous Rhode Island johnny-cakes. I was very glad to listen to the story of the Rhode Island Queen, the little red hen. We know that the Rhode Island Red was originated in Little Compton, and that there are thousands of them there. We have a man in our own State who is well qualified to speak upon all matters relating to poultry at the present time, and we can secure the benefit of his services by attending our very fine college at Kingston, the Rhode Island College. It is a college patronized by all interested in agricultural pursuits. They have a very fine line of professors there, and they are giving instructions that should merit the attention and receive the support of all our people. Amongst the professors at the college, in the poultry line, is Mr. Lambert, of Apponaug. I take pleasure in presenting to you, Mr. Lambert.

## ADDRESS BY PROFESSOR LAMBERT, RHODE ISLAND STATE COLLEGE.

Mr. Chairman, ladies and gentlemen, as the hour is now late, I will not detain you long with this question box. I have two or three questions that have been handed me. The first one is about crossing breeds. "What would be the result of a Rhode Island Red and Brown Leghorn cross?" As I looked at that chart and saw the illustrations of a number of Standard breeds, I said to myself—What under the sun do we need to cross breeds for, when we have so many different kinds now in the American Standard of Perfection? We now have fifty breeds and one hundred and twenty-eight recognized varieties. These are divided into fourteen different classes, including turkeys, ducks, and geese, and each class is characteristic of the race to which it belongs. The American class contains three varieties of the one breed, Plymouth Rocks. We have of the Wyandotte, eight varieties of the one breed and of the Rhode Island Red, two varieties; one breed of the American Dominiques; two of Javas, black and mottled; and the one of Buckeyes. Now, these American varieties are all very like the American business man or business woman, if you prefer to call it that way. Go through the Asiatic class, the English class, the Dutch class, the Mediterranean or Italian class, and as you look over each variety of fowls, you will be reminded of the race of people who originated them. If any of you doubt that, think of the Italian organ grinder as he roams through our land, and then of the Leghorn flitting here and there, and see if there isn't a similarity. And, as for the Asiatics, see how much they make you think of the Celestials, contented anywhere. Perhaps they will lay a few eggs in the winter, but they sit all summer. And thus there is one class after another, some one of them well suited to the different requirements of poultry people without resorting to crosses. I see no reason to advocate cross breeding for any purposes. I saw a man at a Cambridge, Ohio, poultry show, who had on exhibition what he called a new breed. He named it a Silver Spangled Hamburg Cochin. "How do you like them?" he said. I said, "If you keep at it, you will have one of the best mongrels I ever saw." The Rhode Island Red is a grand good all-round business-like fowl. Do not resort to crosses, but take any of the American breeds. Not long ago, a man asked, "Which is the best breed?" Now, I didn't dare to tell him there were no best; his neighbors keep fowls, and all of them claim that theirs are best. If a person asks me which is best breed, I generally ask him what *he* thinks. If he says the Plymouth Rocks are best, I tell him they are. If he tells me he thinks the Wyandottes are the best, I tell him they are. I usually find out what he thinks, before I express my opinion. If you cross the Rhode Island Red with the Leghorn, do not expect to improve on the laying qualities of the Leghorn. You cannot do it. The only objection we have got to the Leghorn is, they lay white eggs and they fly over the barn if that is the lowest obstruction to freedom.

Another question that someone asks, is "What I think of the open front plan of a hen house?" When building there is one good rule to follow, that is, make it just as tight as you can on the north, west, and east side, and as open as you can on the south front. That is the same principle of a barrel. A barrel or hogshead is absolutely tight excepting on the open end, and if large enough would be ideal roosting places for poultry. Have your houses open in front to the sun and air, and then you will have healthy poultry. The healthier your poultry, the more profit. If you think the open front is too exposed, you can use a curtain in cold weather. Don't use glass, because it will draw the sun's rays and will not admit air. Poultry require an abundance of fresh air. If we keep poultry in glass front houses the air is impure, their blood flows sluggishly, and soon egg production drops off and we blame the hen. The healthier we keep the hens, the more eggs we get and the better are the results from them. Someone asked a question about a box covering around the pipe brooder system. I do not advocate the pipe system, anyway; there are other ways of brooding that give good results. If the pipe system has done well for you, go right ahead with it.

Now, right here, I would like to make an announcement, that next week, at the Rhode Island State College, we have our fifth annual poultry show. Entries are free to all Rhode Islanders. We want you to exhibit as many of your different breeds and varieties as you can. Send them down and have them scored, and if they are the best in the class they will win one of the handsome blue ribbons we have down there. We will feed and take care of them for four days, February 15, 16, 17, and 18, and send them back to you with a score-card, and a ribbon if they win one. On February 17th we have our annual poultry institute under the auspices of the State Board of Agriculture, and for that institute we have got two new poultry speakers. Of course we have some good ones here, but we wanted someone to tell us how they do in New York State, so we sent for O. W. Mapes, who has been very successful in keeping fowls in large numbers and can tell us of "Opportunities for Profit in Poultry on Eastern Farms." His lecture will be followed by a discussion as long as questions are asked, providing they do not interfere with our dinner hour. Then in the afternoon we have a man from Lexington, Massachusetts, whom I have known a number of years: he has kept a very prolific flock in his back yard. He is a professional man, and keeps a few fowls for a hobby as a side issue, and he is going to tell us of the "Opportunities for Profit in Poultry on Limited Land." Now, I hope as many of you as possibly can will come down to hear these lectures.

*Question.*—How would the principle of having concrete hen houses do where they were flushed and kept thoroughly clean?

*Prof. Lambert.*—We discussed this question at an institute at Cornell University two years ago. I believe that the majority of those present agreed that, on account of the high price of lumber, we would need to build concrete houses in time. This would make ideal walls for north, east, and west, but we like to keep at least eight or ten inches of mellow sand or loam on the floors, whether a cement or earthern one. This would prevent flushing, excepting during summer when earth had been removed.

Adjourned.

## FEBRUARY 10TH—MORNING SESSION, 9:30.

### HON. F. E. MARCHANT, MASTER, STATE GRANGE, PRESIDING.

*Mr. Marchant.*—Our state is indeed a manufacturing State, and we are many times apt to lose sight of the fact, as stated last night, that we have here some of the best farming land that there is in the United States. While our manufactories are large, still we have quite a large agricultural interest. There are several specialties in agriculture that have proved to be a profit to those who are engaged in them. We have market gardening, poultry farming, dairymen, and this morning the subject selected is "The Dairy." Now, if we expect to make our dairies profitable, we must care for them and feed the animals well. The speaker upon the programme is Professor Charles S. Phelps, who will tell us about the care and feeding of the dairy herd. I take great pleasure in presenting Professor Phelps to you.

*Prof. Phelps.*—Mr. chairman, friends, and brother dairymen, I hope you will not get a wrong notion from the title that precedes my name on your programme which I prefer always to have omitted but which our good friends always think is quite essential to add. It does not indicate that I have not been interested in the practical study of the dairy, and perhaps I will give you a little bit of history of my experience first. For fourteen years I was connected with the State Agricultural College in Connecticut, in connection with the agricultural department. For the past six years it has been my pleasure and good fortune to make an effort, at least, to apply some of the theories of scientific questions that I have taken and studied during the past fourteen years, and to put them in actual practice, and I have found in the course of those six years that I had to knock off a good many scientific theories that had stuck so closely to my heart during that time, but I got a good deal of fun out of it, and I think I got some profit even, to me at least, whether I did to my employer or not I don't know. That is for him to say. In all my institute work, I make an effort to transcribe, if I may so put it, the scientific teachings into a plain and simple practical form, and that is my hope and will be my effort this morning. And if there are any questions you want to ask, I hope you will jot them down in your memories and ask them at the end of the period, or if you want to interrupt me at any time, don't hesitate. I am always one of those men that get right down to business, and have not much time to waste on stories or fun because I believe it is the function of the institute to instruct, and that is what the state pays me for. The little State of Rhode Island, no more than the State of Connecticut, has not much money to waste on institute speakers who speak to amuse their audiences, so I have always made it an effort to cut that feature of the work out. Perhaps the reason for it is, that I am not a bit good at telling stories; perhaps that explains it more than anything else.

## CARE AND FEEDING OF THE DAIRY HERD.

The subject of the care and feeding of the dairy herd naturally falls under three headings: (1) The Comfort of the Herd; (2) The Health of the Herd; (3) The Proper Feeding of the Herd. The topic of breeding and selection might also be included under the general subject of care or management, but this is so large a subject in itself that it would not be wise for us to include it here.

At the outset let me say that the first, and perhaps the most essential, thing in the proper care of the herd is the right kind of a dairyman. Too many are interested in dairying to-day simply because they were brought up to believe that it is the only kind of farming for which their soil and location is adapted. Others feel that they are forced to follow dairying because the buildings and equipment that they have inherited are suited to this branch of farming and to no other. Many more are almost obliged to take up dairying as the only means by which they can convert the directly unsalable products of the farm into salable products of some value. The fact, therefore, that many farmers feel obliged to follow dairying, whether they are adapted to the business or not, may explain, in part, why we have so many shiftless dairymen. Let me advise that no one should take up this line of farming, where they have free choice, unless they have a natural love for the old cow and are as ready to study the conditions that favor her health and comfort as they would be the conditions that promote the health and comfort of a member of their own family.

As our dairy animals are highly domesticated, having, for a long time, been subject to the control of man, they have lost much of their native hardiness. Confinement in warm stables, heavy feeding, the high development of the milking functions, and frequent reproduction have not only modified the general structure but also many of the organs. Man has been the means of modifying the dairy cow until she is now a kind of specialized, nervous organism that must be cared for quite differently from her ancestors of centuries ago. If left to her own choice in that matter, the cow would only give milk as long as her young required it and would naturally breed at that season of the year so that her period of milk production would come during the time of an abundance of succulent feed to be found in the open air. Now the greatest profit in milk production requires that she shall be carefully housed in winter and well fed throughout the year.

The comfortable animal is the most profitable animal, other things being equal. Some of the essentials for comfort are a moderate degree of warmth, a dry stable where good ventilation is provided, a large amount of God's sunshine, and comfortable stalls and stanchions. Sometimes the matter of warmth is overdone but more often the winds of the north sweep through the stables so that the animals are obliged to grow rough and wooly coats in order to keep warm, and the manure freezes into rock-like chunks. The matter of warmth is, however, often provided at the expense of fresh air and dryness. One of the surest indications of poor ventilation in the stable is an accumulation of moisture or frost on the ceiling. Dryness is a more certain index of good ventilation than anything I can suggest. Good air in the stable can be provided by having many small openings for the admission of fresh air, so arranged that drafts of air will not strike directly onto the animals, and a few large air chutes for the escape of the foul air, so arranged that they will draw the air from near the floor and carry it out through the roof. These exit shafts should be constructed on the plan of large chimneys, with the expectation that large and high chutes only will provide good draft and carry the bad air off freely. Comfort and health are often sacrificed by trying to make a saving on bedding. No animal can long remain confortable on a bare cement floor. Shavings and sawdust are so cheap that most any one can afford to use them when straw and other farm-grown litter is lacking. Were I producing pure and high-bred animals, and could have my own choice of stall, I would select the box stall for every animal in the herd, and on every farm where breeding is an important part of the dairy operations there should always be several box stalls. There are always animals in the herd that are not as rugged and active as others and yet that are good producers. These will do better in box stalls than in stanchions. Box stalls too, are always needed, by all cows, for a period of two to three weeks before calving.

It is well to bear in mind that the factors that tend to promote the comfort of the animal will also promote the health. The three diseases that most seriously menace our herds are tuberculosis, abortion and parturient apoplexy or milk fever. These diseases are the outgrowth of our modern system of management. Tuberculosis is unquestionably a stable disease, while milk fever is seldom seen except among highly developed milkers that are injudiciously fed, or carelessly exposed when the system is in a weakened condition. Fortunately for the dairyman tuberculosis can be kept under reasonable control. When we come to realize that it is the damage to our herds and the entailed loss, that makes this problem an important one for the farmer to consider, we shall be in better shape to cope with the problem. We have been considering this disease too much from the standpoint of the public health, and too little from the more personal one of great damage to our farmers through the loss of valuable animals. While good ventilation and plenty of sunshine in our stables may check the spread of this disease, it will never be the means of preventing it. Its highly contagious character makes the dissemination of the disease almost a certainty, if the germs of contagion once become established in the herd. Experience in dealing with a number of serious outbreaks has led me to realize that this disease can be thoroughly controlled by annual or semi-annual application of the tuberculin test combined with the complete removal of all reacting animals from the herd. Probably the most serious disease, next to tuberculosis, with which the dairyman has to deal is that of abortion. While it, too, is probably a germ disease, little is known about its nature or the exact means by which it becomes disseminated through the herd, although it now seems probable that infection enters the organs from the air. Our encouragement seems to lie along the line of preservation by a thorough disinfection of all reacting animals, and of all animals in that physical condition which makes them susceptible to the disease. The washing out of the vulva and the sponging off of the tail and the rear parts with a solution of corrosive sublimate, made up at a strength of 1 to 2,000, is the best preventive measure that I have known. In the case of an outbreak in the herd, this treatment should be followed up daily with all animals more than four months past pregnancy.

The disease commonly known as milk fever gives us the least concern of the three. This trouble is one which good care and proper feeding will generally prevent. It is seldom to be looked for except among the largest milkers in the herd and most frequently where such animals have been too highly fed. The animal that is forced and is inclined to fatten during her dry period is the one that is most liable to this disease. The temptation to practice heavy feeding is great among retail milk producers because they have found that the animal that is fat at the time of the calving is not studied closely enough, because it is commonly thought that a scanty ration at this time is the surest preventive of trouble immediately following calving. If only easily digested feeds, that have to build up nerve and blood, are given in moderate quantities, and the bowels are kept active, there is generally little trouble from this disease. A ration made up of equal parts, by weight, of coarse bran and old process linseed meal, fed at the rate of six quarts per day, together with good clover hay and small feed of ensilage, has given good results with the writer during a period of three to four weeks before calving. I would also recommend, in the case of large milkers that have been a long time dry, or for those that show a natural tendency to become fat during the dry period, that the milking be begun regularly several days before the cow seems likely to drop herself.

The question of the proper combination of feeds for the dairy herd is one upon which we have had more advice from our scientific friends than upon almost any other question of farm management. Much of this advice has not been savored with the salt of practical experience, and the farmer has too often rejected it for just that reason. The scientific man needs to come in contact more than he does with the conditions of everyday farm life, so that he can simplify his teachings, and make them more flexible, that they can be made to fit the needs of the varying conditions found on the different farms. Owing to the prevailing high price of all grain feeds, and the prospect that these prices will continue high, it is essential that the feed question should be carefully studied if we are to expect much profit from our herds. Too often the boarder cow and the grain dealer block the road that might otherwise lead to a fair profit. We are feeding too many cows of the 3,000-pound type. The range in the cost of feed for different cows in a herd will seldom vary more than 25 per cent. from the highest to the lowest, while the range in total sales from different individuals will often vary 100 per cent. The scales and the Babcock test should be a regular adjunct to every well-managed herd. One or both of these gives the only safe means of judging of the worth of individual cows as breeders or as profitable producers.

During the past ten years the price of dairy products has advanced only about 20 per cent., while the price of all grain feeds has advanced from 80 to 100 per cent. I believe we have arrived at the stage where we should produce more of the feed needed by our herds on our own farms. It costs very little more to produce good clover hay, oats, and peas, or a nice quality of ensilage, than it did ten years ago, while to-day there are several well-tested newer feeds that can be grown with profit. Alfalfa has been grown with much success in nearly all parts of Connecticut during the past few years, and I believe that the climate and soil of Rhode Island are better adapted to the crop than many parts of Connecticut.

What we are most needing to-day is a number of leguminous grain crops, well adapted to our climate, that will supply us with protein feeds, to supplement the undue proportion of carbonaceous feeds that our farms are now furnishing. More than a dozen years ago the writer advocated soy beans as a promising grain crop that might be fed in place of such feeds as cotton-seed meal or gluten feeds. I believe that this crop will come into use as a valuable substitute for the nitrogenous by-products that have not reached such a high figure. Oats and Canada peas may be made a valuable dairy feed on farms with large fields well adapted to grain growing.

Above all things, do not allow yourself to be fooled into the belief that the so-called mixed feeds are valuable because they are lowest in price. They have no value beyond that represented in the different substances entering into them. Too often worthless material is thus covered up and the farmer is led to believe that by a skilful blending of different materials, material of low value will be made as valuable as the best in the mixture. Do not be deceived, "Men do not gather grapes of thorns, nor figs of thistles."

In practically all cases the object in selling such mixtures is to foist upon the unsuspecting purchaser, in disguise, some product that would at once reveal its worthlessness were it offered in its true guise. In buying it is a good rule to stick to standard products, and to make a close enough study of feeds to be sure that you can meet the wants of your herd better by doing your own mixing than by trusting it to some one who, perhaps, never fed or milked a cow.

*Question.*—How many crops do you get of alfalfa?

*Prof. Phelps.*—Three crops is common in Connecticut. You get one crop in the early part of June, another crop the early part of August, and another crop the last of September, and five tons of alfalfa hay per acre is a common yield.

*Question.*—Do you have any trouble from blowing?

*Prof. Phelps.*—I don't think there would be any necessary trouble at all. I would advise cutting it while it is wet.

*Question.*—Give us your formula of mixture of grain.

*Prof. Phelps.*—That is a rather difficult thing for me to do. The prices of the different things vary considerably, and there has been a considerable change in the last two years. Two years ago I was using 400 pounds of wheat bran, 200 pounds of gluten, and 100 pounds of cotton seed, and 100 pounds of linseed. That is a good mixture for the generally healthy animal. To-day I would not use exactly that mixture, because of the change in the relative prices of feed. To-day, I don't believe, for milk production, you find anything any cheaper than a good mixture of about 300 pounds of the best dried brewer's grain, with 200 pounds of cotton seed, for a profit in milk production, when you take into consideration the relative prices of the different dairy feeds. The gluten feeds have soared to a point where they are relatively too expensive to-day. The same is true of the O. P. linseed meal. I should always want some O. P. linseed meal in my stable and in my barn for the sake of using it at the time of calving. But bran feeds are relatively high to-day. If I didn't use the dry brewer's grain I should use the bran seeds. I sometimes use bran and brewer's grain, and in that case about half and half by weight, and feed as high as six to eight pounds a day, according to the condition of the animal and the amount of milk she was giving.

O. P. linseed contains about 5 per cent. less digestible protein than cotton seed.

*Question.*—Your ration would not work in Rhode Island because farmers here don't raise carbohydrates necessary. They buy them.

*Prof. Phelps.*—I am advising them against their buying them. In the ration I gave I should feed home-raising food in connection with it, in connection with the ration of that kind, or, say, 300 pounds of dried brewer's grain and 200 pounds of cotton seeds, and I should want to use a good proportion of ensilage, or else, if I thought I could not get along without it, a good proportion of dried beetpulp and also early-cut hay, or early-cut clover, hay preferably.

*Question.*—What would you do if dried brewer's grains and beetpulp were not available? They are not available in our vicinity. What would you do in that case?

*Prof. Phelps.*—I think you can make dried brewer's grains available without much serious practical trouble.

*Question.*—They are practically out of the market.

*Prof. Phelps.*—They are practically out of the market because they have been concocted up with the railroad mixtures that sell to a greater profit; therefore they are all monopolized.

*Question.*—Would you feed all cows alike, the same ration?

*Prof. Phelps.*—I feed them, using the same ration in mixture, but not in quantity, depending, of course, whether I was producing milk or making butter. If I was making butter I should not feed the same ration as for making milk, because the question of the quality of the butter has got to be taken into consideration as well as the question of the quantity of milk.

*Question.*—Is it not a fact that some cows do not need the same amount of food?

*Prof. Phelps.*—Yes, that is the case. You will find sometimes where the animal refuses a certain kind of food and she has got to be coaxed to eat it. You have got to vary from the rule in those cases. You always should expect to have to meet that. I was advising along the line of general principles.

*Question.*—You do not use any corn meal for this ration?

*Prof. Phelps.*—I would not for the milk production. I think we make a mistake every time when we go into the market and buy corn meal or hominy feed for milk production.

*Question.*—What about cream or butter?

*Prof. Phelps.*—That is quite a different proposition. There you have got to take into consideration the quality of the butter, the cream and butter, and there you would feed hominy food or corn meal. It would be all right. I would not feed both, because they are too much alike; but give a fair proportion of those foods in with them. I might find it advisable to omit entirely brewer's grain because of the possible effect on the quality of the butter, and substitute dried bran with the gluten seed and a small proportion of O. P. linseed.

*Question.*—Is it not well to make a change of the feed occasionally?

*Prof. Phelps.*—Yes, occasionally, but not too much, not too often. If you get them accustomed to a good ration, a well-compounded ration, I think it is better to keep them fairly uniform during the winter season than it is to be changing frequently.

*Question.*—Don't you find it as good a plan as any to keep the cow healthy? to study her well?

*Prof. Phelps.*—Yes; if you surround the animal with the other conditions favorable for health, the ration will do its part even if it remains much the same throughout the year.

*Question.*—A post-mortem examination, as I read, reveals in the human family about 80 per cent. that are afflicted with the tuberculin germ; but in most cases it is dormant and will remain dormant, unless conditions arise to stir it into activity. Now, in the tuberculin test, under some conditions existing in the bovine, is there not danger of stirring this germ into activity?

*Prof. Phelps.*—I don't think so, for myself, that there is any deleterious effects whatever from the proper use of the tuberculin test.

*Question.*—Can you tell us about the money value of the feed you give to your cows, daily per cow?

*Prof. Phelps.*—At the present time I am starting in,—since last fall,—I am starting in the farming business for myself. I am not on the place I have been on for the past six years, so that I am not buying and handling dairy feeds this winter, and I am not feeding a dairy herd just under our present conditions this winter. I know that feeds have changed very materially from a year ago and three years ago.

*Question.*—What would you consider the proper grain value for a a quart of milk?

*Prof. Phelps.*—That varies so with the cost of food that I could not very well answer that question for this winter's condition.

*Question.*—How does the cow get the tuberculosis? breathe it in, or eat it?

*Prof. Phelps.*—She may do either. The most probable is that she eats it, I think. I would not say it is the most probable. It may be quite as probable, and I don't know the chances. That is a pretty hard question to answer, but I think the chances are about equal. It is well known that dried sputum is a very common source of the dissemination of the germs from the stable. Dried sputum means pus in the form of dust, and she would have to take it in the form of dust or else get it off from the manger. There have been so many, many, cases where tuberculosis has manifested itself first through the digestive tract as to indicate that it must have been taken up from the digestive tract. It is quite as common, I think, to find that developed from the digestive organs as it is from the lungs, so that the chances are about equal.

*Question.*—Don't facts prove that it is more a digestive disease than otherwise?

*Prof. Phelps.*—Well, it has been clearly shown, in recent years, that the feces are the common means of the spread of the germs. That is a source that they have not thought much about until the last two or three years.

*Question.* Is that the way other animals get it?

*Prof. Phelps.*—It may be.

*Question.*—What do you think of ventilation?

*Prof. Phelps.*—I think we are coming to a time when we are going to simplify our stables very much. I think we are bound to modify our storage barns and stables to a great degree and obtain a much simpler and sanitary form of light and air, which shall be running from the storage barn rather than have the animals all in one building. I think there is where we have made a mistake and oftentimes been at a greater expense than we would have if we had built a shaft of light in the storage barn where the herd was not kept and then had built a long low shed, making it reasonably tight, for the warmth of our herds.

*By the Chairman.*—I am sure we could continue this discussion. Now, if there is any one that has any further questions, please make it pointed and brief, because we could continue this till one o'clock, probably, and make it very interesting and instructive, but we have two other speakers upon the programme and we want to give them some time. If there is any one has a question, make it brief and to the point.

*Question.*—You spoke about the prevention of the milk fever. Two weeks before calving we give a dose of salts in a quart of water, and directly after calving. We never had any trouble since we tried that.

*Prof. Phelps.*—That has been a very common practice with me, to give a dose of salts immediately after calving, depending a little upon the condition of the animal, as to the condition of the excrement.

At this point Mr. Louis G. K. Clarner is called upon to sing a song, and responds.

*By the Chairman.*—At this day and age, when there is so much discussion in regard to the purity of the milk supply and the uniformity of the milk standard, the subject of dairy inspection is of special interest. I take great pleasure now in presenting Professor Leon S. Merrill, dairy inspector of the State of Maine.

## Value of Dairy Inspection to the Farmer.

### PROF. LEON S. MERRILL.

Mr. Chairman and friends, I realize that the subject of dairy inspection is not one that is generally looked upon with favor by the man who is producing milk, but I wish to tell you, before I have entered upon the discussion of the subject at all, that I represent the Department of Agriculture of the State of Maine, and with that department is placed all authority for the investigation of dairy products, the production, the manufacture, the transportation, storage and sale; that the department of agriculture in our State not only considers itself the friend of the farmer, but is so regarded by the farmers themselves, and whatever work we have done along this line, has been done with a feeling of extreme sympathy towards the man who is producing dairy products. I have no prepared lecture. I have had no time to prepare one. I can simply tell you of the work we have done in Maine, and something of the results that have come from that work, and no single sentence I shall utter should be taken as theoretical. It is simply the result of the practical application of the inspection of dairies. I wish there was some other word that could be used in place of that word "inspection." Only a short two years ago, we were not very much interested in the inspection of dairies. It is true we had heard of the work being done in other States, and by cities and towns in our neighboring state. We had read criticisms of that work and the arguments made in the advocacy for it, yet it had not impressed itself very much upon our minds until there appeared, in the late fall of 1907, a report made by the State Board of Health of one of our sister states, in which the dairy products from our State found a ready market, a report that was couched in terms so caustic, and to our minds so injurious to the markets for our products, that it seemed to call for an immediate investigation, and as all authority was placed in the department of agriculture, it naturally fell to that department to conduct the investigation. We entered upon it with the idea that, if the report was true, then those farmers were producing milk contrary to the laws of our State, and it was the duty of the department of agriculture to carry to them the needed information to enable them to produce milk that would meet every reasonable market requirement. Several difficulties immediately confronted us. How should this investigation be made? And what form of report should be used? It impressed us first that the report of the investigation should be detailed and not general, and, of course, the work should be carried on by a man who was thoroughly fitted. I am sorry to say, that we had no one who had had practical experience in the inspection of dairies, consequently the commissioner of agriculture detailed the State dairy inspector and to his assistance called Mr. S. C. Thompson, formerly dairy instructor in our State, and who was then about to accept an important position with the dairy division of the federal government. For the want of a better report, and on account of the short time at our disposal, the United States score card for the official inspection of dairies was selected. A visit was made to every one of the dairies shipping milk out of the State of Maine in the towns covered by the report issued by the board of health in question, and as a result of that inspection,—I am not going to talk to you about the results of the details of that inspection, because the State of Maine has published its answer to that criticism in a bulletin form,—but as a result of that inspection we became so thoroughly convinced of the efficacy of dairy inspection conducted along right lines that our department officially adopted a policy of dairy inspection which practically means carrying information to the farmer. Our department has at the present time six men who are engaged in the work of carrying to the farmer information along different lines of agriculture. Several of our cities have been interesting themselves in a purer and better milk supply. They have adopted, as is the custom of many cities, certain ordinances which they published in proclamation form and sent out to the farmers. I am not very much in favor of that way of handling the proposition. Our experience has developed the fact that the local conditions under which milk is marketed are frequently more objectionable than the conditions existing upon the farms where the milk is produced. That is especially true in one of the largest cities in our State.

The inspector must be fitted for his work educationally. It must be practical and scientific. If I was going to describe a man who was especially fitted to do this work I should say that it needs a man who has been brought up on the farm, who knows the farm from the farm side, that he should have the scientific information that is given to him at our agricultural colleges, and, above all, that he should possess an abundance of common sense. I should say that the man who has supervision of inspection work ought to be a man who has had practical experience in the milk business. The inspector should be able to approach people tactfully. He should be able to gain their confidence, to convince them that he is there to give assistance, that he is there to bring them information, not only as to the proper construction of the dairy barn, milk room, and apparatus to be used, but the methods to be followed, and that he brings them information as to the condition under which that milk they are producing is transported to market and distributed to the consumer. That particular part of the milk business has been too often overlooked by our city authorities. An inspector should not attempt to point out to the farmer any change to be made in his equipment unless he carries with him a good idea of how that change should be accomplished and the amount of expense to be incurred.

I remember very well an instance when judgment in inspection work was needed. In the investigation we conducted in the early days of 1908, I ran across one man who was constructing a milk building to be used for the housing and caring for his milk. He told me that he was directed to do so by the board of health. I asked him where he had been keeping his milk, and he took me down from the barn about eight rods away to a spring with a well-house over it. The spring had been stoned up, and he had been storing his milk in cans there in the spring water. I found that the water was cold. There was a large amount of it running away, and in many ways it formed an ideal place for the storage of milk; and yet that inspector had told him that he should immediately construct a room to be devoted to the care of the milk, close to the barn where it would be convenient. Now, gentlemen, that was simply an economic question. It had no relation to the quality of the milk. If the man was willing to take his milk down to the spring house, eight rods distant, it was of no possible interest to the consumer of the milk in the city. So we see there is a necessity for sound judgment all the time.

Last year I was asked to go out with one of our city milk inspectors for a few days, so that he might gain an insight into the work. He had never inspected a dairy in company with another inspector. We agreed that we should each make our record and at the end of the inspection of the dairy we should then compare notes. I noticed every few minutes he would be looking over my shoulder. I told him, "You can't learn to inspect dairies that way. You must depend upon your own judgment. When we get through we will compare the figures we have made." "Well," he says, "I just looked to see how you scored that last item upon the score card." I examined his score card and found he had made the score one point higher than I had, and I told him I thought he had given too high a credit. His reply was, "Oh, never mind, I will even that up on the next score."

Again let me emphasize the fact that an inspector should be educated. He should have a practical education as well as a scientific education. He should have tact. He should have sound judgment. He should make a report that is detailed and not general. All inspection should be reasonable in its requirement and frequency, and should be done, if possible, in the presence of the farmer. We found it to be true that in the inspection of dairies in our state, conducted by the representatives of the board of health of a sister State, it was the policy of the inspector to avoid meeting the owner of the dairy if possible. It is our policy, in Maine, to go to the door of the house, if we do not see the owner in the yard or in the barn, and inquire for him. If he is nearby we either go and get him ourselves or ask some member of the family to do so, in order that the inspection can be conducted in his presence. Our inspection is done, as a rule, out loud, talking over with the dairyman each item of the score card. Many times I have asked the farmer how much he thought he ought to be scored upon certain points and he has almost invariably scored himself lower than I would have done. Another point to be observed in making an inspection is that only the important matters should be emphasized at the time of the first visit. A great mistake made by many inspectors is that they indicate too many things on their first visit for the farmers to change. The inspector should constantly bear in mind those conditions that will influence the quality of the milk, calling the attention of the farmer to those things that will most influence it. He should not criticize so many things or require so many changes that the farmer will say, as have many farmers in New England, "I will go out of the business,"—using, however, language more emphatic and expressive than I have used.

Now here is what we may expect as a result from dairy inspection done along right lines. We may actually expect more economical production of milk because there are so many ways in which the practical inspector can help the dairyman, so many changes that can be made that will result in more economical production. It is strange to say, but true, that nearly every change in construction and equipment required to produce good milk also results in more economical production. I want you to think of that statement when you go home. See if it is not true, whether a ceiling made from matched boards is not an economical thing in the dairy, whether or not the platform and the gutter properly constructed is not an economical proposition. You can trace it all through the matter of equipment and I think you will find that my statement is true that any reasonable requirement in equipment will also result in more economical production. It will also bring an improved product. It will result in more harmonious relations between the producer and the consumer.

Our inspection in Maine comprehends not only an investigation of the production of milk on the farm, but in order that the farmer may also be protected it includes inspection of the transportation, the storage, and the distribution of milk. I have been in many places down in our State where milk was bottled, and I have found but few—and I am saying this advisedly—I have found but few that would meet the same standard of requirements placed by boards of health upon the producer of milk. I have visited many bottling places where the only equipment used in the cleansing of cans and bottles was two small sinks, or tubs, one of these sinks filled with partially warmed, dirty, soapy water, being used for washing the cans and bottles, and the other sink filled with cold water for rinsing them. From this cold rinsing-water the cans and jars are taken and placed on a rack to drain, and then the cans are sent out for the producer to place his milk in, a space of several days in time elapsing between the time they are washed and the time they arrive back in the city filled with milk. From these cans the milk is poured into an open mixing tank, into which dust may easily fall, and from which the milk is then drawn into the bottles that have been washed in the manner just described. You can readily understand that there may be many troubles the consumer would experience with that milk that can be directly ascribed to lack of ordinary care upon the part of the distributor of milk. The producer, however, is the one usually blamed.

We have some very progressive creamery men in our State. They are business men. They understand that there is a great deal of agitation going on in our cities and larger towns and that in many places false impressions have gained ground, and because they are business men, they are saying to the producers of milk, "if you will sell to us your milk under certain conditions we will pay you an additional price." This is a very practical method for the improvement of a milk supply. Many of our creamery men visit the dairies of their patrons twice each year, using inspection blanks or score-cards furnished by our department. They are put up in book form, so that with the use of carbon paper three copies can be made at one writing. One copy is given to the farmer, another comes to the department of agriculture, and the third is retained by the inspector. The extra price paid for milk or cream coming from a herd of cows free from tuberculosis and other diseases and produced under good conditions, amounts to about one cent a quart, or one to two cents a pound for the milk fat it contains. It seems to me, gentlemen, that is a practical proposition. I have never yet found a man who was not willing to produce milk in splendid condition if he was to receive a proper recompense for it.

I omitted to state that one of the things we insist upon, is that a copy of the inspection report shall be left with the farmer at each inspection. It answers three purposes. It leaves a written opinion of the inspector with the farmer, it keeps the inspector doing his work accurately because it leaves behind him either a record of his competency or his incompetency. It is a protection to the farmer as well as of educational value to him. We use blanks arranged similarly for our city milk inspection.

Now I have occupied practically the alloted time, but I want to call your attention to two or three things of importance we have found in actual inspection. A great many times farmers do not understand what the city people want. Here is a case. We received a complaint that a certain man was producing milk under absolutely indecent conditions and refused to make necessary changes. I visited him, and I am free to confess, that the conditions did come pretty near being indecent. I found him pleasant and agreeable to meet. He claimed he could not find out just what changes were required of him. I am not going to defend any man who is producing milk under conditions obviously wrong, but the outcome of my visit convinced me that ignorance concerning proper methods was the real difficulty, for when I left him he said to me, "Mr. Merrill, I am going to make the changes you have suggested. You are the only man who has told me just what to do in order that I may produce milk that will satisfy those people. They simply growled at me every time they met me. That is all they have ever done." The report for this inspection showed an equipment score of only 42 points out of 100, and a method score of only 21. While his equipment was poor, his methods were very much poorer. In two weeks I had a letter from the board of health, or the inspector of that city, telling me that he had made the changes exactly along the lines I had suggested.

Many times farmers have a spendid equipment that will pass even the inspection of our most exacting city inspectors, but if they would only make a closer and more careful examination they would find the farmer was not doing as well as he ought to do with it. Here is a record of one that scored 84 for equipment and only 61 for method; another that scored 75 for equipment and only 52 for method. Here is one, however, where the reverse is true, for the equipment scores 71 and his methods 83½. Here is another one with equipment only 52, while the methods scored 76. Think of it. Still another one with equipment 51 and methods 80. There is a little story that goes with the last report. When I came to this man's house there was no one home. I passed to the next one, but before I had left he came to the place and asked me to go back and score his dairy, saying, "I am very anxious to know how to improve upon my methods."

*Question.*—That means that with poor equipment you can get good results?

*Prof. Merrill.*—Absolutely so. I had not made that comment, because I felt sure the scores I have been calling to your attention would reveal that fact.

Now, how do our farmers look upon this work? A year ago last December, the Maine Dairymen's Association held its annual meeting. A resolution was presented and adopted at that meeting, as follows:

"*Resolved,* That the best interests of dairying in the State of Maine would be promoted by definite and official barn inspection, tending towards sanitation and oversight of the dairy product until final delivery to consumer. And we recommend such legislation as will place authority in the State Department of Agriucltume to this end."

I do not believe that a like instance has ever happened before; at least I have no knowledge of a similar resolution having been adopted by the dairymen themselves in any other State.

Milk has never been sold on its merits. Milk produced under both good and poor conditions has been sold at the same price. Practical dairy inspection will tend to remedy this condition. I believe that eventually all dairies supplying milk for family use will be visited by inspectors once or twice each year; that the dairyman will be given a certificate of merit, providing his score exceeds a certain per cent. This certificate he could exhibit to the consumer or contractor, and it would entitle him to a recompense commensurate with the care and expense necessary for the production of first quality market milk.

It may be unknown to you, but five years ago the creamery men in Maine began the grading of all products received at their creameries and the payment for the same upon the quality plan. All milk and cream received that could be used for sweet cream purposes was paid for at an advanced price of three cents per pound of milk fat. While at the time the plan was adopted at least 50 per cent. of all the milk and cream received was unfit for sweet cream purposes, yet within six months from the adoption of the plan 90 per cent. of all the product received was of such quality as to warrant its use in the sweet cream trade, thus showing how quickly the man upon the farm will respond to any proposition which pays him for exactly what he produces.

Now in closing let me present a summary of what in my opinion constitutes practical dairy inspection. First of all, supervision of all dairy inspection should be had by men possessing a practical knowledge of the business. The work should be educational in its scope. It should not partake so much of police methods as has been the practice in the past. The inspector should possess a practical and scientific education together with an abundance of common sense and tact. The inspection should not be hurried. It should be made in the presence of the owner of the dairy, and if in his presence the scoring should be done out loud, discussing with him the different points scored. It should include all phases of the dairy business. Heretofore the investigation of the transportation, storage and sale of dairy products has been much neglected. The inspection report should be a written report. It should he in detail and a copy left with the owner of the dairy. Practical inspection work will not omit an attempt to educate the consumer as to the proper methods to be followed in caring for the milk in the home. This can probably be reached more readily through the medium of milk institutes than by any other plan. Dairy inspection is good, if of the right kind and well done.

*By the Chairman.*—I was quite interested to note the statement of the speaker of the manner in which this subject was approached, in which they approached their work, and to see how you are sustaining the farmer, not carrying a club to the farmer, but how much assistance can be given to him in the production of a high grade of milk. Has any one any question they want to ask?

(There is no response.)

Hon. Abel F. Stevens is called upon at this point, and recites a poem, entitled "The Scrub Cow."

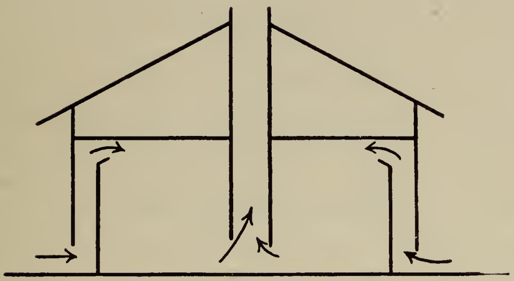
Mr. Louis G. K. Clarner is called upon to sing a song.

*By the Chairman.*—We will now listen to an address on the care of the barn where the dairy herd is to be found, by Professor Coleman, of the Rhode Island State College.

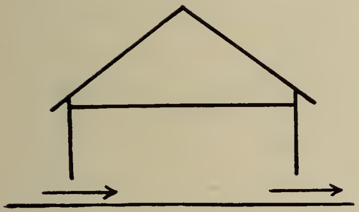
## CARE OF THE BARN WHERE THE DAIRY HERD IS CONFINED.

### PROF. COLEMAN.

Ladies and gentlemen, I am going to make my remarks rather short. I would like if all in the back part of the hall will come to the front. I am going to perform two or three experiments, and there are several charts which I have to show this morning. You have been considering, this morning, the subject of feeding cattle, but there is a food which cattle need just as much as grain, or hay, which we are inclined to neglect, and that is the matter of air, the air we breathe. You all know that a fire must be fed with air in order to burn. We ought to consider these facts, that a fire needs to be fed with oxygen. You know that the heat of our bodies comes from the union of food with oxygen, in the lungs, and just the same occurs when oxygen unites with wood in the common fire. Whenever an ordinary fire of any kind is made, part of the food for that fire is the oxygen of the air. We consider often that the oxygen of the air is unnecessary, but we find these facts, for instance, that a cow needs 2,800 cubic feet of air per day, weighing just 220 pounds. The ordinary food of the cow, per day, is somewhere between 25 to 35 pounds of grain and hay together, yet the air that cow breathes weighs just about ten times as much. Nine-tenths of the food of the animal is air and not solid food as we ordinarily consider it. The horse requires 3,400 cubic feet of air per day, weighing 280 pounds. Swine require something like 1,000 cubic feet. People require something like 750 cubic feet of it, weighing 20 to 30 pounds, a day. All the food and water we drink and eat, only weighs six to twelve pounds a day. The oxygen unites with the food and forms carbon-dioxide, which is then breathed out. That same thing occurs when the fire burns. The ordinary smoke from the fire is carbon-dioxide. I want to show you what carbon-dioxide is. This is an ordinary alcohol lamp. When it burns, the carbon of the alcohol unites with the oxygen of the air and forms carbon-dioxide. Carbon-dioxide is a heavy gas, but when it is first burned it is very hot, and the hot gas always rises. I want to show you that a piece of burning wood lowered into the jar will burn (jar No. 1). On the other hand, if I were to fill this entirely with carbon-dioxide from the alcohol lamp it will not burn (jar No. 2). Another glass I want to fill with carbon-dioxide from my lungs (jar No. 3). Number one is supposed to be full of oxygen gas. As long as the oxygen remains the fire will burn. Now let us see what happens when I put this into the one I breathed into (jar No. 3). I put this taper in it and it goes out immediately. I will try that again. I want you to notice closely. That is because of the carbon-dioxide from my lungs. There is no oxygen to allow it to burn. I can repeat that a number of times and it will put the flame out each time. In jar No. 2, filled with gas from the lamp, the burning stick is immediately extinguished when lowered into the heavy gas. This gas was first light because it was warm; now it is heavier than air and will remain in the jar even though the cover is removed. I wanted to wait a little bit until this becomes cool because this one thing that I want to call your attention to, the one thing I want to prove, if possible, is that carbon-dioxide really is heavy compared with air. That puts it out also. I am now going to leave these jars open for a little bit, and we will see what happens. We will see whether the carbon-dioxide rises out or not. There is a case in history which happened in 1756 in India, where part of one of the British regiments was placed in what is called the Black Hole of Calcutta. It was a sort of cistern, I suppose, most structures in that part of the country are made of stone of some sort. It was small, eighteen feet square, and 146 men were placed in this hole and left over night. Those men shrieked and yelled all night. They were suffocated for want of air. Next morning just 23, history records, came out alive; just simply from the fact that they had no oxygen. They were simply drowned, you might say, in carbon-dioxide, which was so heavy that it would not rise out of this hole. This occasionally has occurred in theatres; when the theater has been poorly ventilated; the carbon-dioxide collects at the bottom of the room, and cases are known where people have fainted, and it has been found that those who bent over the person who had fainted, were the next to faint. They were apparently breathing carbon-dioxide gas in the lower part of the room, while the upper part of the room may be quite pure. Even yet my carbon-dioxide is still in this bottle. Let us see what happens in this other bottle. I hope by this time that this is cool,

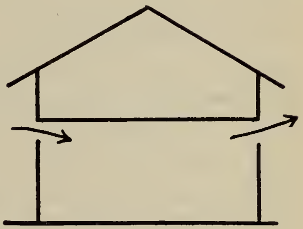


King System of Ventilation.



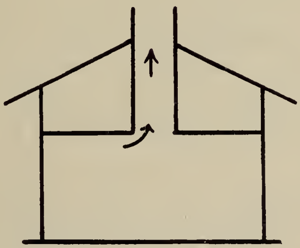
No. 1.

Simply a cold draft along the floor.



No. II.

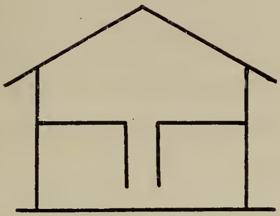
The warm and pure air is lost.



No. III.

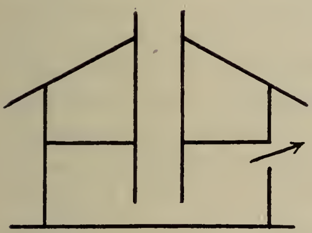
The warm and pure air is lost. Same effect as a high ceiling.

and that it has not all gone out. In proper conditions, bottles can be left in that condition for five or ten minutes and the carbon-dioxide remain in them, but just as soon as I turn the bottles this way, upside down, as if to pour out the water, the carbon-dioxide is so heavy that it all goes out in a few seconds, perhaps in half a minute, just the same as any heavy liquid is poured out, and by that time there is a sufficient oxygen, as a rule, to support combustion. You see my taper burns quite readily. If you collect any carbon-dioxide gas from the lungs or a fire and cool it off thoroughly, you would find that very gas that shoots up readily is heavier than ordinary air, and collects in the bottom of the room. Now, in our ordinary barns we have just the same condition of affairs. Most dairymen want a barn that is fairly warm. The cow will produce more on a given amount of food if the barn is fairly warm. If she is not warm, she requires more food, and most barns you will find are walled up closely. There is no interchange of air unless perhaps, there is an opening somewhere through a window or floor. The first attempt of most people to ventilate a barn of that kind is to open a window and let the air in. In that case they lose the most valuable air. The air on top is not impure. It is warm, and it is the best air in the building. When you open a hole in the walls, you will find you lose most of the warm air. Take a case where you make an opening along the floor. You know what happens when you open a door in an ordinary room. The first thing you feel is a cold draught on your feet. The poorest kind of a ventilator is the one in which you allow the fresh air to come in at first at the floor. It does let out the impure air, but it does let in the cold air on the floor. The warm air stays on top. The next step is to shut up the room and open the window at the top. That does not allow the cold air to come in the floor so readily, but it does allow all your valuable air to escape. The farmer should have warm air. It is a food for the cows. Where an opening is made at the top you lose your warm air, which has a tendency to rise (see Fig. 2 and 3). The next step suggested for ventilating such buildings is the ordinary chimney of a fireplace. That is a good ventilation for the reason that it takes up the air from the floor. I have attempted to show this in my diagram No. 7. Here is a fireplace chimney running down from the roof to the stable near the floor. This method of ventilation takes out this impure air. This is cold compared with the air in the top of the stable, yet it is really warm air compared with the air outside, therefore, rises. If you go to your fireplace, even if there is no fire,



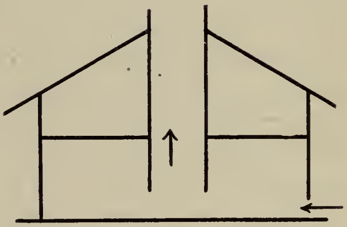
No. IV.

Ventilation flue is too short to produce an upward draft.



No. V.

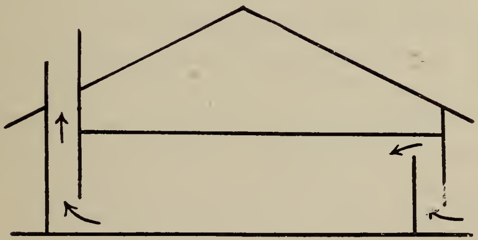
Warm air escapes on windy days.



No. VI.

Foul air is taken out but permits a draft along the floor.

THE CORRECT SYSTEM.



KING SYSTEM OF VENTILATION.

Cold and foul air is taken out through single large flue, similar to fireplace. Fresh air comes in through small openings, is mixed with warm air before striking animals. Intake flues so arranged that warm air will not be lost. Large flues to be 2 ft square for each 20 cows. Ten intake flues each 6 inches square.

you will find there is a suction drawing the air out of the room up the fireplace, taking out the cool impure air from near the floor. A farmer in another State asked me how to put in a ventilation system which would work. I told him simply to make a shaft similar to a chimney running right through his barn above the roof, and then I explained to him how to arrange the letting in of air in small quantities through the wall. When I came back a few months later, he had built this shaft and there was such a strong suction that it would take chaff and even corn husks out of the barn. He had arranged to let the air in in this manner, allowing it to come in from the outside between the studding (see the top diagram on the sheet). He made a number of these small inlets in order to prevent a draught on the cows,—he made them all around the stable,—by which the air entered around the studding, went up a little ways and then into the building. That naturally brings in the fresh air which mixes with this warm air at the top of the room before it strikes the animals, and also it forces the warm air, which we want to use, to where the cattle are. In the ordinary stable the warm air is above the cattle. The cattle may be quite cold while at the top of the stable the air is quite warm. The stable may be built very tight, the air in the stable will be quite warm, and unpleasant and disagreeable, thus showing the lack of good fresh air. After putting in this system, in the case of the man I referred to, you could not see that the stable was any colder. The air was infinitely purer and I noticed that the stable odor was gone; in other words, he was saving his warm air for his cattle and taking out the impure air by these means, and it worked well in windy weather and still weather. I know another man who attempted to put in such a system. He made a shaft leading up a short ways, then he made it bend at right angles, then let the air out. Now, our engineering friends tell us that when a shaft is bent at right angles it has only one-half the capacity that it has if it is straight. If you build a chimney in your house or stove, and make a right-angle turn in it, you will find it don't draw half as well. I know another case where a man made a short shaft in his stable (See fig. 4). That didn't work, for this reason: Why is it that the manufacturer builds a tall chimney? In Scotland some of the chemical works build their chimney five hundred feet tall. They don't do that to get the fumes out of the way. They make those tall chimneys in order to make a draught and the higher the chimney, the stronger the draught; the shorter the chimney, the weaker the draught. I wonder if any of you have noticed in building fires in a stove, where you have a high chimney, or a short chimney; if you have noticed that the taller the chimney is, the stronger the draught. When this man built this short shaft he got no draught whatever. A good chimney should be airtight. It should be straight. If it supplies all the necessities of a good chimney, it will remove this air from the bottom of the room in a satisfactory manner. If it fails to comply with these things necessary for a good chimney, as a rule it will fail to work. I knew another man who built a ventilating shaft and made it very small. It was only about a foot square, and though he had twenty-five head of cattle that shaft could not remove all the air the cattle breathed. I know three places where this has been put in correctly, where it worked admirably. I know one barn where the ventilating shaft is at the end of the barn. It is a barn having about fifty head of cattle and the barn is something like sixty or seventy feet long, the ventilating shaft is at one end of the building, yet it works successfully, indicating that it is not absolutely necessary to be in the center of the building such as this (see diagram at top of page). To remedy the defects in the ventilation of stables the shaft should run down near the floor, something like this (see fig. 7), taking the air from the floor where it is quite impure, and the air should be taken up in between the studding, and not permitted to go into the room until it reaches near the ceiling in this manner. If those conditions are followed, you get your fresh air where it is also mixed with the warm air before it strikes the animals, and produces no draught. I have passed around a number of leaflets which I wish you would take with you. I hope there is enough for each person to have one. I have tried to illustrate, in the first place, how to do it (figures 1, 2, 3, 4, 5, and 6). In the second place, how to put in a ventilation system. I have illustrated the King System in its most perfect form. The ventilating shaft is near the center of the room. No. 1, is an illustration of ventilating a building as most people do, by opening the doors or leaving cracks in the building. In such cases you just simply have a cold floor. No. 2 is a method of ventilating by which you open the windows and let the most pure and most valuable air pass out. No. 3 is the same thing. It has the same effect as a high ceiling. No. 4 has too short a shaft to make any ventilation. No. 5 in this case you lose the most valuable air on windy days. No. 6 allows the air to come in along the floor and the result is they are cold rather than warm. No. 7 illustrates a ventilating shaft where the ventilator is kept at one side of the stable, such as the one I have mentioned. It does not necessarily need to be in the center of the room but may be at one side, permitting the air to come in at places around the room and taken out through one single shaft.

The points which must be followed in putting in a ventilating shaft of this kind are these: In the first place, the air must be taken out through a single shaft. Don't make a large number of small ventilating shafts. That central shaft should be large, single, just the same as a fireplace. The places where the pure air comes in should be small and numerous. If they are small and numerous they will not produce a draught upon the animals, but still supply them with fresh air.

Perhaps, you are wanting to go to dinner. If there is any one who wants to ask any questions I will be glad to answer them, if possible.

*Question.*—Suppose the stable was full height?

*Prof. Coleman.*—Did you ever see a stable where there was no ceiling? What I mean is this: is not such a stable very cold? Where your ceiling is high, your stable is very, very cold. Is it not true that, in summer time, the coolest rooms are those which have the highest ceiling? If you want a cool room, you want a high ceiling.

*Question.*—Suppose the posts were eight or ten feet high, why would you make the shaft up as far as the eaves? My cow stable is thirty-two feet wide, and what I was thinking about was having my draught come in here (indicates on diagram) or come from there, into the roof.

*Prof. Coleman.*—You mean at the ceiling,—the roof, but also the ceiling?

*Question.*—Yes, that is the rafters, that is the ceiling.

*Prof. Coleman.*—You have rather a difficult problem there, because your ceiling is not part—in other words, your stable is something like this (draws diagram on paper). That would work with this one qualification. This flue should always be long enough to produce part of the suction as opposed to any forces which might tend to draw the air out here (indicates). The power of the draught depends considerably on the length of this ventilating draught. If you have a high ceiling, that means that this must be higher. If you have a very low ceiling, this must be somewhat lower; in other words, this must be very much longer in dimensions here.

*Question.*—It is 8 feet 5 up to the eaves. Would that be high enough to take in the air?

*Prof. Coleman.*—If you take in the air eight feet high?

*Question.*—And the shaft was sixteen feet?

*Prof. Coleman.*—Is the top of your stable sixteen feet above the cattle?

*Question.*—The shaft would be sixteen feet through from below, from the floor.

*Prof. Coleman.*—Yes, it would be better if it was still higher.

*Question.*—Would your shaft be obliged to go up to the eaves of the building in order to get a draught in all directions?

*Prof. Coleman.*—I think there is one of the misconceptions. Very many people think the wind is that which causes the draught of the chimney. That is not true. There is just as good a draught on a still day as on a windy day. It is not the wind that blows across the top of the chimney which produces the draught. It is the light air which produces the draught. I notice a great many people seem to think that there may be little truth in the fact. The wind may blow down it and force the draught, but a very light column of air, rather than the action of the wind, on a perfectly still day, you would find that there would be a draught even then.

*Question.*—That is not in point. That shaft you have there is on the north side. Does that come to the eaves on top of the big roof? You get the north wind, and the wind will blow down there through that shaft. I have demonstrated that.

*Prof. Coleman.*—How large was your ventilating shaft?

*Question.*—It was not my ventilating shaft. My chimney is a 6-inch chimney. It works well unless the wind is north.

*Prof. Coleman.*—There is no question but it is much better to make it high. You can't get too high. Now, as to the dimension: Your cows breathe 2,800 cubic feet per day. This shaft should be two feet square for every twenty head of cattle. If the man makes it smaller, he can not move as much air as the animals breathe. The usual proportion is to make provision for about two feet square for every twenty head of cattle. The in-take flues should be as large, in the aggregate, or larger than this, but they should be distributed through a large number in such proportions as would give about two feet square for every twenty head of cattle. At the experiment station we have one of these ventilation systems, and they have there forty head of cattle, and the ventilating shaft is three feet square, that is, there is a clear square foot in the ventilating shaft for the forty head of cattle, yet it works well to have one ventilating shaft.

*Question.*—Most Providence men have a cupola at the top of the shaft.

*Prof. Coleman.*—If you have laid your shaft right through here, and the cupola was large enough to permit all the air to get out, that might do.

*Question.*—The cupola might be still covered over?

*Prof. Coleman.*—Yes; you could leave your cupola on, but it should be open on the sides, to allow all the air to get out of it. I should use the cupola. Most people, however, don't like to have the shaft run through the center of the barn.

*Question.*—In case you have that, what would you do with the cupola, take it away?

*Prof. Coleman.*—No; I should leave it on the barn. The gentleman I mentioned about, had a cupola on his barn. He had a hayrick through the center of the barn and he made his ventilating shaft something in this manner (indicates).

*Question.*—If you were going to construct a barn, would you construct that with a hayloft where the cows were kept?

*Prof. Coleman.*—If I had plenty to put in the building, I would have the hay over the animals. Theoretically, I suppose, there is an objection to having the hay over the animals. Practically I think that is the way to build it, because a building which is spread out, only one story high, requires a great deal of shingling, and there is a great deal of building space to keep in repair; but if you make your buildings high you will find you have much more capacity with far less material.

*Question.*—This matter of inspection which they are going to carry on. They would have objections to the hay being over the cows.

*Mr. Merrill.*—They make no objection if it is sealed over and tight. Bear in mind, the effect on the quality of the milk is what we are after. We are trying to eliminate theory entirely.

*Question.*—Dust comes down.

*Mr. Merrill.*—Yes.

*Question.*—Supposing the shaft went up clear to the roof, that it followed the roof up.

*Prof. Coleman.*—That would work all right, providing these angles were made larger rather than smaller, then the shaft on those angles should be made quite large.

*Question.*—That would be the most economic way.

*Prof. Coleman.*—Yes. I know it worked all right.

*Question.*—How about the shaft coming within six inches of the floor?

*Prof. Coleman.*—Within a foot of the floor.

*Question.*—Would a shaft three feet square be large enough for forty cows?

*Prof. Coleman.*—Yes; or two feet square for twenty, that is four feet square area for forty, something like that in proportion.

*Question.*—How high should that project, even with the peak of the roof?

*Prof. Coleman.*—That is a question to answer like the question of the cupola, just the same as a chimney.

(At this point the chairman announces that a recess will be taken, during which the experimental union will meet.)

(Recess.)

## FEBRUARY 10TH—AFTERNOON SESSION: 2 O'CLOCK.

### DR. H. J. WHEELER,

### DIRECTOR, RHODE ISLAND EXPERIMENT STATION, PRESIDING.

*Dr. Wheeler.*—I wish to say to the farmers to-day, that a ton of corn stover will produce as much milk as a ton of hay, and that we have the best market of any city in the United States. I am impressed with the fact that farmers should grow more corn. Every cow in Rhode Island ought to have corn stover instead of hay.

It gives me very great pleasure to introduce, this afternoon, a man who is as well qualified as any man in this country to speak on the question of corn. I refer to Professor Foord of the Massachusetts Agricultural College. I have pleasure in introducing him.

## THE GROWING OF CORN.

### PROF. J. A. FOORD.

Mr. President, ladies and gentlemen, I wish I could live up to that reputation. I am afraid I cannot, still I might say that my early training was on a farm in New Hampshire, and that after graduating from the agricultural college there, I spent nine years in agricultural work in New York, Delaware, and Ohio, all good corn-growing States, and there may be some points about the growing of corn that I have learned in my residence in these different States that may be of interest to you. Let us discuss, then, for a little while, this matter of growing corn, for I believe most thoroughly that we should raise more corn in New England, and also in what Dr. Wheeler has just said of the feeding value of corn fodder.

With reference to growing corn, Mr. Brewer, who is to follow me, has the most important part of the subject, and that is the selection of the seed. It is important in New England because we have not paid as much attention to it as I think we should have done. There are other points, however, but first I want to show that it is worth while to grow corn in New England at present prices. For the last two years the price of corn in New England has been about seventy cents a bushel. The average price for the last ten years has been about sixty cents a bushel. While I was in Ohio we kept records on the cost of producing corn, and that has been continued so that they now have the results of four years' work, in raising corn on the college farm. The labor and seed cost, on areas varying from fourteen to sixty acres,—fourteen in 1905, sixty in 1908,—has been from $14.07 to $17.64 per acre. The yield has been from 55½ to 79⁸⁄₁₀ bushels of shelled corn per acre, and the labor and seed cost per bushel in the different years has been 20 cents, 29 cents, 23 cents, and 22 cents. There is no reason why we should not raise corn nearly as cheaply as they do, except for fertility. We may have to add fertility, and another thing we ought to do is to clear out our old fences and old stone walls and get ready for modern machinery. We cultivate too many little one-horse patches, and we cannot use modern machinery to advantage on such pieces. We have not lived up to our opportunities. The western man has gone ahead of us. The New England farmer is intelligent, but don't you think we are apt to be too conservative? The western farmer is riding in his automobile while we are still cultivating one-horse patches of corn.

Now let me tell you briefly about an acre of land at the Massachusetts experiment station, upon which twelve crops of corn have been raised during the last eighteen years. The other six years the crop has been grass, and as the average yield of hay per year, per acre, has been nearly 2½ tons, I think we can safely leave these six years out of the calculation. Let us consider, then, only the twelve crops of corn. When the experiment began, the field had been in grass for some years, and would at that time produce thirty to forty bushels of shelled corn per acre without manure or fertilizer. The fertilizer used has been nitrate of soda, 200 lbs.; dried ground fish, 200 lbs.; acid phosphate, 200 lbs.; muriate of potash, 250 lbs. To-day I should certainly advise the use of sulphate rather than muriate of potash, because it gives better results, on our soil at any rate, with the clover crop. Possibly in some light soils the muriate would be as good. Dr. Wheeler can tell you much better about that than I can. The cost for this fertilizer has been from fifteen to eighteen dollars, depending upon the market. Our labor cost, based upon average results on the college farm, has been $20.08 per acre. If to the maximum fertilizer and labor cost we add $7.00 for seed, taxes, and interest, the cost per acre will foot up to $45.08. The average yield on that acre has been 56 bushels of shelled corn and more than 2½ tons of stover. If you allow $8.00 per ton for the stover, which is certainly a reasonable price, considering the price of timothy hay, you will find the grain has cost us just about 45 cents a bushel. Isn't it cheaper to raise it at 45 cents a bushel than it is to buy it at 70 cents a bushel? Suppose we take, not the average yield, but the yield that we had in 1908, of 90 bushels of corn and 4 tons of stover, the labor costs only a little more, the fertilizer costs the same, the interest and taxes cost the same, and if we allow the same price for the stover, the shelled corn cost us only 15 cents a bushel. Suppose the fodder was only worth $5 per ton, we still get a cost of only 31.6 cents per bushel for the corn. Now, gentlemen, hadn't we better raise more corn?

But are we maintaining the fertility of that acre? The average yield for the first two years, 1891 and 1892, was 56.3 bushels of shelled corn; for the two years of 1907 and 1908, the average was 72 bushels of corn; and in 1908—an exceptionally good season—the yield was 90 bushels of corn. The average yield of stover, in 1891 and 1892, was 4,000 pounds; for the last two years the average yield of stover was 8,054 pounds. It will be evident from these figures that the land is not decreasing in fertility by this method of raising corn, and that we are practicing what Professor Spillman, of Washington, calls scientific farming. He defines scientific farming as that kind of farming that pays a handsome profit on the investment and leaves the land better than it was before. Here in America very many of us, although not so much in the New England States as in the west, have been soil miners and not soil farmers; but the time is coming when we have got to quit the agricultural mining business and become farmers, practically and scientifically; that is, we must get an interest on the investment and leave the land as good, if not better, than we found it.

I have explained this experiment in some detail to show you my reasons for thinking it is worth while to raise more corn in New England; it is not good business policy to pay sixty or seventy cents a bushel for corn when we can raise it for thirty.

One of the most important things in raising a crop of corn is to get good seed. The speaker who follows me is to tell you about the selection of seed, but I know he will not object if I give you a few figures, just to emphasize this fact. I don't know how far apart you plant your corn, but I suppose your practice does not vary very much from ours in Massachusetts. If you plant corn in hills and three and one-half feet apart each way, you will have approximately 3,600 hills per acre. It may vary a little with the shape of the field. If you allow ten per cent. for worms and crows and accidents, there will be 3,240 hills left. If each of these hills produces three one-pound ears, you will see that the yield will be about 130 bushels of shelled corn per acre. But you will say we cannot all raise one pound ears; we can, however, all of us raise half-pound ears. We all ought to be able to get a pound and a half of ear corn per hill. If we do that, we shall have nearly 70 bushels an acre. Now, why has the yield of corn in New England for the last ten years been about 40 bushels per acre? Lack of care in the selection and germination of the seed planted is a large and important factor in the answer, in fact it is one of the most important problems, in my estimation, in getting a good crop of corn.

I am very often asked to recommend a good variety. Let me say this: right in your own locality there is probably being raised a variety of corn that is better adapted to that locality than any corn you can send away and get. But, if you decide to bring in a new variety, don't try very much of it. Try a small piece the first year, and if you must buy seed corn, buy it on the ear. We ought to keep on insisting on this until all seed corn is sold on the ear. As to the Flint or Dent varieties, it is for you to decide. I would remind you, however, that at the experiment station in Maine, further north than we are, they have raised more actual food value per acre with Dent than with Flint corn; also at the Pennsylvania station, which is 1,200 feet above the sea, they have raised more food value per acre with Dent corn than they have with Flint. I feel with reference to some of our Flint varieties, that we are not using all the season we might; we are using 90 days when we usually have 120 days between frosts that we might as well use.

The fertilizer question I hesitate to touch on, because Dr. Wheeler is here, and he knows the Rhode Island conditions. He can tell you just what you ought to use. I might say, however, that with reference to fertilizer for corn, I always think of those experiments carried on by Professor Brooks, some years ago, in which he tried the application of nitrogen, phosphoric acid, and potash separately in an experiment in each county in Massachusetts, with the average results that potash increased the yield of shelled corn 11.3 bushels; nitrogen, 4.7 bushels; and phosphoric acid, 3.6 bushels per acre. The increased yield of stover was in the same ratio, although even more strikingly in favor of potash. These results seem to show that potash is an important element in the production and growing of corn, and if not present in the soil in available form, it should be supplied. On the experimental acre that I spoke of, potash was applied at the rate of 125 pounds to the acre and nitrogen less than 40 pounds; the clover crop, of course, added some nitrogen. Professor Brooks, who has had a longer experience in Massachusetts that I have, recommends for corn at the present time, about 150 pounds of nitrate of soda, 200 pounds of dried ground fish, or high grade tankage, 200 pounds of acid phosphate, and 200 pounds of sulphate of potash per acre. This has given good results on the experiment station farm at Amherst.

It seems unnecessary to say anything about culture to this audience. I believe in *clean, shallow, level* culture for the corn crop, and our experience shows that such treatment will give good returns.

*Question.*—Did you apply it all broadcast?

*Prof. Foord.*—Yes; as a rule. The corn starts very slowly in the spring. It seems as if it never would get four inches high. I would say further that one of the important things in a good crop of corn is moisture. To retain this moisture is important. Don't forget the moisture that most all grains need. Chemistry shows that for every pound of dried matter in the plant, the finished plant, from 250 to 350 pounds of water has got to be supplied. There is enough potential fertility in our soil for fifty to sixty crops, perhaps one hundred crops. It seems to me we had better use level cultivation to maintain dust mulch to hold the moisture in it. There is not any sense in making hills and increasing the curve line. Our corn hills simply give more surface for the evaporation of moisture. It would be better to keep down flat, and the moisture would then be for the use of the plant. I think that is important. I would keep that corn clean. I believe in clean culture. If you can not do it with horses, do it with men. Now, on the help question. What does the manufacturer do with reference to his labor. He has to build houses for his help, and if every farmer in New England who keeps a man around would build a house for his help, the farm labor question would be a good deal nearer settlement than it is to-day. I say we are not treating our farm help quite fair. We are not giving them as good an opportunity as they can get by working for the manufacturer. With those who keep stock, the farm laborer has got to get up in the morning long before breakfast. He has to milk. It is not fair not to give them a house to live in. I believe it will pay good interest on the investment to put up a house for the farm helping man. In one instance, a place not two hundred miles from this state, I was told that the best investment they made was that house right across the way that they kept their farm help in, and they had got another one in the woods, with only two rooms, and when the help go there they feed themselves.

*Question.*—How are you going to get those extras?

*Prof. Foord.*—What extras?

*Question.*—The house for the man to live in, and treat him so that he does not have to go to work at seven o'clock in the morning.

*Prof. Foord.*—It is ridiculous to talk about a ten-hour-a-day man. The man whose hired man has a house on his place is not suffering from lack of help. He almost always feels what he pays in rent to the garden he does not pay in cash. I had rather pay a man in garden sass than I would in cash.

*Question.*—How many more hours a day does a man work on a farm than on the street car?

*Prof. Foord.*—I don't believe he works any more, but he does not wear brass buttons.

*Question.*—It has been said a while ago that we ought to adopt more modern methods in raising corn and farm stuff. I believe that is a fact. Let us look at the statistics of our own little State, and what do we find? We find that fifteen per cent. of the farms are owned free from all incumbrances; sixteen per cent. are heavily mortgaged; and sixty-nine per cent are rented, leased. Now, then, it shows that sixteen per cent. of the farms of this State are not in a condition to adopt those modern methods and tear down these fences of mine and thine and get this western machinery. There is the problem that has got to be solved. That is the thing that has got to be solved differently from what the citizens and farmers of this country have tried to solve. It has got to be solved at the ballot box. I can't see how we can adopt those methods when we don't own the farms, and have not got the money.

*Prof. Foord.*—In Massachusetts we own the farms. Regardless of what the gentleman said—he admitted there was fifteen per cent. owned, and sixteen per cent. mortgaged. That leaves thirty per cent. A good many farms in the west are only rented, but they adopt modern methods. It is cheaper to raise corn by horse labor than it is by man labor. You can try it out on any crop of corn you want to raise this year, and I think you will find that the crops of corn will pay you for the additional improvement that I suggest. There is one other thing with reference to the cultivation that I would suggest. We have found that the corn roots pass up through the land, that is, if you care to dig up in connection with the corn, or wash it out with water, you will find that the ground underneath is honey-combed with roots. They must find water. The plant must take all its food in solution, and consequently must take it in water. Another reason for shallow cultivation is this: You cultivate not very deep. In spring you continue to cultivate at the same depth. I would not go any deeper by any means, because you kill out the weeds of the surface soil. Some people will go down quite deep and dig up new weed. As it is the deeper you go, the more of those old roots you bring to germinate on the surface. Very many of us will go deep, quite deep. Now, that is a mistake. You don't get to the weed seeds. You never would hurt from any level cultivation. We seed in the cornfield and follow with the cultivator. That germinates in forty-eight hours, at any rate within a week. That seed under ordinary conditions has got a good start. Gentlemen, I hope a good many of your members will raise more corn this year in Rhode Island, because I believe it is a profitable investment.

*Question.*—Is there any way of keeping the crows away from the corn?

*Prof. Foord.*—I would set the corn on top of the ground and feed them. A man got up in an audience like this, this winter, and said that the expense to him had been from eight to ten cents an acre for keeping the crows. If you can save your corn at an expense of eight or ten cents an acre, it is worth while to do it. The crow is our friend. He is an insectivorous bird and we ought to look after him, and we can afford to feed a bushel of corn in the spring to keep the crows off.

*Question.*—Does not tar deter the corn from germinating?

*Prof. Foord.*—Cornell Experiment Station furnished last year a bulletin showing that there was very little influence on germination. You need not put on a great deal. If you are going to use a planter, you will necessarily have to see that it is fairly dry before using it.

*Question.*—I understand you put the fertilizers broadcast and plow them in, harrow them in?

*Prof. Roord.*—Yes; I would plow them in.

*Question.*—Have you had any experience with the wire worm?

*Prof. Foord.* Not very serious. The experiments I mentioned of an acre of corn, in 1893, the yield was only 29 bushel per acre. It was the work of the wire worms. In recent years we have not had much trouble with wire worms.

(Mr. Louis G. K. Clarner here renders a musical selection.)

*Dr. Wheeler.*—I understand for many centuries, and in all civilized countries, great credit has been given to the man who could make two blades of grass grow where one grew before. We have the pleasure to-day of listening to a man who was able to produce the largest yield of corn per acre of any man in the United States, in 1908. It gives me very great pleasure to introduce Mr. Brewer, of Connecticut, as the next speaker.

## SELECTING SEED CORN, BY MR. N. HOWARD BREWER, CHAMPION CORN GROWER OF THE UNITED STATES, FOR 1908.

*Mr. Brewer.*—Ladies, and gentlemen, I will agree with Mr. Foord that it is the selection of the seed corn which is by far the most important point to be considered in growing corn. I want to show to you how it was I became interested in the growing of corn in Connecticut. I am located over on the Connecticut river, just a little ways southeast of Hartford, on a tobacco farm, tobacco being our main crop, really the crop that we get most of our support from. The farm consists of about 160 acres. This past year I raised 35 acres of corn, and 20 acres of tobacco. It was in 1904 Mr. A. D. Shamel came to Connecticut to carry on some tobacco experiments. One of his experiment plots was located on our farm. This put me in touch with him. For eight years previous to this he had been one of the leading corn men in the west. He had worked in co-operation with Mr. James L. Reid, the originator of Reid's Variety of Yellow Dent corn. Through him I was able to get four or five ears of early Dent corn, from Mr. Reid's farm, and in 1904 he wanted me to plant it. I didn't plant it until the spring of 1905. Previous to this, my father had tried the Dent corn. He never did have any success with it. Of course, I was of the same opinion, nevertheless I planted it. It was planted on a very poor piece of ground. In fact, we never cultivated it with the horse at all. We went through it once, cut the weeds out when they were small. When the corn was maturing, we cut out the big tall weeds. That is the way we raised corn four years ago on the farm. We devoted our attention to the raising of tobacco. When that corn was husked that fall, it was put in a building where three acres of Flint corn was stored. That was stored on one side of the building, and the Dent put on the other side of the crib. From that planting of a quarter acre of Dent we got nearly one-third as much corn as from the Flint corn. The next year I was able to pick out a type of corn from the 40 bushels that I had, of the kind of ears that we thought would grow in Connecticut and do well on our farm. That was planted next year, and the Orange

Judd Company offered a prize for the best acre of corn grown in the United States. I won it, with 121 bushels of shelled corn to the acre. The next year, 1907, it was a poor growing season. I only got about 70 bushels of shelled corn to the acre. Along in the fall, at the time when we supposed it would be ready for husking, there was anywhere from six inches to a foot of water over some parts of the field. Then there came on a spell of cold freezing weather and it was a wonder it didn't kill it out entirely, but in one portion of the field, where the corn matured early, some ears were dried out and I was able to pick out about 25 ears suitable for planting in 1908, and this corn made an average yield of 118 bushels to the acre. On one acre I got a yield of 133 bushels, which Dr. Wheeler referred to as what I won the prize with.

I want to state that each year the National Corn Exposition has held its meetings in the west, I have attended all of them. I have gone through the corn-growing country in the west and specially visited the progressive corn men there to learn their ideas, how they grow corn both for seed purposes and for food purposes, and at the exposition I was able to come in contact with the best men in the country who are authorities on corn, and the ideas which I gained there are beyond words to express.

Now, in regard to the culture which I give my corn, it is practically the same as the other progressive farmers that are around here in New England give theirs, with the addition that I gained from the west. As a result of this I have been able for the past three or four years to grow very productive crops of corn. I don't deal only in Dent corn. I raise a large quantity of corn for canning purposes; also a quantity of Flint corn. I have been carrying on experiments for the department of agriculture on sweet corn. This corn is all used for canning purposes. The desire was for a very nice variety of sweet corn. My work was mostly on the early Crosby sweet corn and the Golden Bantum sweet corn. This past year, through the department of agriculture, I procured some seed corn of a very early variety called Malakhof corn which came from Russia. As I remember it, some early Crosby was planted in Russia and this corn was selected from that, and they claim it has matured in 52 days. The earliest I had matured was 58 days. It is very early and very sweet. It is unlike the Corey corn. The Corey corn is not quite so sweet. In regard to the culture of corn, I practice only the level cultivation. In legumes and vetches I have had success.

I have tried alfalfa, but have not got as much success as with vetches, with which I have had excellent success, growing good crops each year, which added fertility to my soil for the next year's crop.

*Question.*—Is that a winter vetch?

*Mr. Brewer.*—Yes, a winter vetch. I sow this in the corn about the time the corn is earing out.

At the time the corn begins to mature I go into my field and make my field selection. I don't go to the portion of the field where it has been favored by moisture, the amount of fertilizer, or new ground, or possibly outside furrows. We often notice on the outside rows ears very nicely capped over at the end and very heavy, very productive ears. After studying the experiments of the leading seedsmen of the west, we find that they go into their fields and pick out the very productive hills, the best productive ear for planting their seed next year, and they plant the selected and most productive ears obtained from the productive hills. They have their breeding plots to develop their stock seeds. I have adopted the breeding system on two 10-row plots and two acre plots, with my Dent corn, namely, one plot rough and the other smooth. The smooth type thus far has given me the best success. This last year, with fifty hills to the row and two kernels to the hill planted 3 x 3 feet apart, I was able to make a yield of 87 bushels to the acre from my smooth type. From the same ground, with the same conditions, on the same field, I was only able to make a yield of about 67 bushels for the rough plot on my productive acres planted from twelve ears, selected the year before from my breeding patches. With the smooth type I produced a yield of 127 bushels and from the rough a yield of 112 bushels. So the yields correspond exactly. The reason why the rough does not yield as high as the smooth was because the rough is a later maturing one than the smooth type which was matured fully when it went into the crib, whereas the rough was not, and the result was that in the drying out of the corn the rough type, of course, shivelled up more, didn't weigh as much as the smooth corn. In selecting the seed yourselves, in the field, a good plan is to select an ear that is cylindrical in shape. There are varieties of Dent corn which are tapering. In order to improve Yellow Dent corn we must select an ear cylindrical in shape, with a deep kernel nearly as deep at the tip as it is at the butt. And then again, the kernels should run perfectly straight from the tip to butt. The deep kernels should all be the same size, that is, the kernel of the butt should be nearly the same as the kernel at the tip. And it is essential that the ear of corn should be perfectly filled out at the butt. There is no excuse for any one not planting an ear that is not perfectly filled out at the butt. At the tip it is a little more difficult to get an ear perfect. We find in the Dent corn that the ear begins to be pollenized, at the butt. When the ear begins to develop, it begins to go over into a drooping position on the stalk, consequently the tip does not become pollenized. Then again, when we have a short maturing season the ears will make a good-sized nubbin, as we call it. The ear does not wait to develop, and for that reason we get more short ears in the Dent than we may in Flint corn. I want to state here, in my experience, Flint corn has a higher feeding value than Dent. Taking into consideration a yield from a field of Dent corn and the yield from Flint, the greater profits can be made with the Dent. The Flint corn tests about two per cent. higher in protein than the Dent corn, so it is worth that much more, but when we take a load of corn to the mill and sell it, they won't pay you any more for Flint corn than for Dent. The elevator men in the west figure 56 pounds to the bushel, whether of high or low feeding value. It requires a little more moisture to grow a feed of Dent corn than Flint, from the fact, as Professor Foord stated, it takes 250 pounds of water to grow every pound of dry matter in the corn. For every pound, 250 pounds of water, or practically that. For every stalk in the field it takes one barrel of water to grow it. We know that in this past season, for instance, we surely didn't get a barrel of water in our country, per stalk, growing in the field. We have to depend on the moisture, then, that is down underneath. Then again, that is one reason of advocating dust mulch on the field. A damp ground will mature Dent corn better than a dry ground. For that reason a Dent corn requires a good deal larger stalk and will weigh so much more. And the Flint corn will do better in an arid region where we don't have so much moisture. In properly caring for seed corn it is essential that it be taken the best possible care of after it is taken from the field. If we neglect to pick out our seed in the fall and endeavor to take it out next spring from our cribs, we find a condition that is not satisfactory. We go to the cribs, and possibly it may be a little bit mouldy; and again, you might have in the crib a large percentage of moisture. Then again, there may be a freezing spell, and a good deal of corn is hurt by the freezing weather. It has become the custom, and it is the practice by, I guess, a majority of corn farmers, now, to thoroughly test their seed corn in the spring. During the experiments throughout the west it has been found best to have the seed corn tested and only plant ears that will grow properly, and the result has been an increased yield of from five to thirty-five bushels. So when we take into consideration the amount of ears that it takes to plant an acre of Dent corn, that 12 ears will plant it solid, or about 12,000 kernels planted 3 x 3½ feet apart, if there is one ear in twelve that fails to grow you would not readily see it, but the yield would be cut down one-twelfth; and if two ears don't grow, one-sixth would be cut down, and take that number of ears from our yield of corn, and you could readily see where we would be out. There is a way to avoid the trouble of having the seed corn frozen up, and that is taking it and storing it over in the barn where it is protected from the freezing weather, or else storing it in an attic where a chimney goes up through. This is probably one of the best places to store it. There are several ways of placing the ears to keep them apart, to keep them from touching each other. The best way for keeping several bushels of corn is to lay an ear on a table and take a long string and tie it right through the middle, and then tie another one, and so on, and then hang them from the rafters. Then again, we can build a little rack so as to lay the ears so that they don't touch each other. Then another way is to hang them up in traces, but this is not very satisfactory. In hanging a trace of corn it is possible some ear may touch another, and in moist weather they will collect dampness, and where they touch they are liable to get mouldy. I studied in particular the methods used by the western people in drying the seed corn, and this last year I had several thousand bushels to cure and, in fact, I cured some for my neighbors. I installed an ensilage cutter with a blower attachment. My seed-house was originally a tobacco warehouse. We have a brick basement with a sorting room in it. I was able to have a hot fire in the room, and blow the hot air by the ensilage blower, conducting it with pipes up through the floor. It was put upon racks and the ensilage blower forced the hot air up through it, and then over the hole where the air came from the blower there was a fan kept revolving still forcing the air up through the corn. On the northwest side, the ventilators being wide open, causing the air outside to come through and pass over the top of the corn. This caused a horizontal draught which took the air which was laden by moisture by the time it got there and carried it off through the ventilation on the south side.

Our winds were practically northwest, last fall. They are every fall, for that matter. And the corn was dried within a week to about eight per cent. of moisture, when the heat was turned off and was allowed to dry as corn usually dries. This experiment has been conducted by many western brothers, and they make the statement that they have been able to increase the ear yield from five to twenty-five bushels per acre in the last ten years. That statement is carried out by several experiment stations out there. The same condition is true with sweet corn. Sweet corn is a very difficult thing to cure. We cannot put it in the crib as we can field corn. It has to be either cured on the stalk, in the fall, or else taken and placed on racks. My method has been to place it on racks and also to place it on a wire frame, where these ears can be put from three to four deep, and allowed to dry out. With the right weather conditions, of course, sweet corn,—we can pick early enough to get the advantage of dry weather. One day in October is worth three days in November for drying corn. One day in November is worth a week in winter weather, in drying corn. After it once freezes there is no hope for the corn again.

If there is any question, I would be glad to answer, before I go on further.

*Question.*—What temparature do you take of the air in drying?

*Mr. Brewer.*—I don't take any temperature. The room was not probably heated over 80 to 85 degrees.

*Question.*—What kind of fertilizer did you use for that big crop of corn in 1908?

*Mr. Brewer.*—On the land that I grew 133 bushels—was a piece that had been in grass for the past four years, previous to that time had been in potatoes. After the sod was turned over I had about three ton of tobacco stalks plowed in. The ground was naturally wet and the stalks tended to hold the soil up. I also tiled the land so as to carry off the water still better, and on the whole was placed 600 pounds of fish and potash which analyzed 3–8–6. That is all the fertilizer we used throughout that year.

*Question.*—Do you think you can raise corn at a profit if you don't raise more than the average?

*Mr. Brewer.*—I think the average will just about pay for the amount that I expended on raising corn. There would not be any profit in the average.

*Question.*—A man that is below the average, he is doing business at a loss?

*Mr. Brewer.*—Yes.

*Question.*—What experience have you had with clover?

*Mr. Brewer.*—Clover does not start as quick as vetch. I set about three-quarters of a bushel to the acre. Then sow wheat or rye with it.

*Question.*—Sow rye with it?

*Mr. Brewer.*—I have for the past two years, and raised good crops of vetch seed.

*Question.*—Why is it so high?

*Mr. Brewer.*—It is raised principally in the west,—large quantities are imported from foreign countries. The first crop will yield only seven bushels to the acre along with seventeen to twenty bushels of rye. It is difficult also to separate the vetch from the rye, both having seeds about the same diameter.

*Question.*—How big would the vetch get to by the time freezing weather would come?

*Mr. Brewer.*—It crawls along on the ground when it is first planted, and it thoroughly covers the ground so as to protect it from washing.

*Question.*—Would there be much crop by the time it would be time to plow again in spring?

*Mr. Brewer.*—If we get a whole lot of sun through the early spring it does better.

*Question.*—Do you plow that in the spring?

*Mr. Brewer.*—Yes. It then reaches a height of eight to twelve inches.

*Question.*—Mr. Foord, from Massachusetts, stated the fodder value, at $8 a ton. Do you not think that the fodder from the Dent variety, that is, the greater amount of fodder can be raised than from the Flint variety? I find it so in my case. I find that two acres of the Dent fodder was cut and fed my cows longer than three acres of Flint variety.

*Mr. Brewer.*—Yes, sir. I think that is true.

*Question.*—Did you ever use your corn stover in any way except in the dry state?

*Mr. Brewer.*—No, sir. I never have. I use an ensilage cutter to cut it up.

*Question.*—Do you use the stalk itself, or ear?

*Mr. Brewer.*—I pick out the ear from the best stalk.

*Question.*—Suppose there is a better ear on another stalk in that hill. What is the criterion, the stalk or the ear itself?

*Mr. Brewer.*—It wants a stalk that is large enough to support the ear on which it is growing. We want a stalk of a height that will support the ear. The ear ought to be a little bit below the middle of the stalk; that is, the ear ought to be in a good position for the man to husk if the corn is left standing. It wants to be the right height so that we can husk it conveniently.

*Question.*—Do you sometimes have barren stalks?

*Mr. Brewer.*—Yes, sir. When I started I had barren stalks in my field. I detasseled all the barren stalks, and in 1908, on the acre, a man who aided me said he didn't believe that I had got a barren stalk. On an acre he could not find one in a hundred stalks but what had an ear on, and on the whole acre I didn't get a bushel of small ears.

*Question.*—When do you plant corn?

*Mr. Brewer.*—I planted this year, on the 17th of May.

*Question.*—When was it fully ripe?

*Mr. Brewer.*—It was fully ripe about the first of October.

*Question.*—Do you use any animal fertilizer?

*Mr. Brewer.*—No, sir; I use fish.

*Question.*—I meant, from the barn.

*Mr. Brewer.*—I never use any manure; no sir.

*Question.*—Do we understand you that corn can not be grown at a profit, take it as a whole through the country?

*Mr. Brewer.*—Why, yes; corn surely can be grown at a profit here in New England as well as it can be out west. We have a market for it right here at home, and the price we get for corn is enough more than to make up for the difference in the cost of the fertilizer. Of course, in the west they don't have the expense for fertilizing that we do here in New England, but our market is enough more to pay that difference.

*Question.*—Do you consider using corn stover in the dried state, you get anywhere near the full feed value of it?

*Mr. Brewer.*—No. Corn stover needs to be wet in order to get the full value.

*Question.*—Don't you consider an acre of stover a year will pay for all the expense?

*Mr. Brewer.*—I don't think so.

*Question.*—How do you handle your corn stover?

*Mr. Brewer.*—I husk the ears and nubbins. I find that the stalks pay all the cost of raising the corn. The way that I handle my stover,—I have tried several experiments this winter,—is first, I cut up about four acres, put it into the barn. It immediately began to heat. I spread it on the barn floor, put 100 pounds of salt on it, and by changing it over there I have been able to keep it very well. Then when I cut up the next batch I salt it as I cut it. This is packed down in front of our cows. I had a box made just about the size of the manger and through this box I spread the corn stover, then pour two pailfuls of water on, and then I have a lid that fits down over the top of that, and in four hours from that time it is ready for feeding in the mangers. They will eat every bit of it. I got more milk doing that way than I did in feeding dry stover.

*Question.*—How far apart do you plant your Dent corn?

*Mr. Brewer.*—3 x 3½ feet apart, leaving on an average three stalks in the hill. The germination of corn is a very important part, and the selection of corn. We all want corn that we are sure is going to grow. As I said, one ear in ten that don't grow cuts the crop down one-tenth.

*Question.*—How tall do the stalks grow?

*Mr. Brewer.*—From nine to twelve feet, according to the fertility of the soil.

In regard to the stand of the corn. There was a neighbor of mine bought some of my corn this last year, and planted three acres. He was very careful to get a good stand. He planted it 3 x 3 feet, and he had five kernels in every hill. He had an elegant field of tall corn up to the time it began to tassel out, but he had so many stalks in the hill that the corn failed to mature. He could not understand the reason, and the whole reason was, he had too many stalks in the hill. Probably the field would average about four stalks to the hill.

That is too much for Dent corn. We can get more corn if we have a comparatively thin planting than where we have a thick planting for Dent corn. Then, again, just before his corn was laid by, he went through with his shovel cultivator, went about three inches deep both ways, and the corn immediately started to fire up from the bottom, and it was about two weeks before the corn outgrew that and the roots got started and began to grow again. He had between 80 and 90 bushels of shelled corn to the acre.

*Question.*—Do you plant one kernel in the hill a foot apart or four kernels in the drill?

*Mr. Brewer.*—In 1908 I tried an experiment of one acre in drills and one acre in hills. I found I could take care of an acre of corn planted in the hills more economically than in the drill and yield essentially no more from the drill than in the hills; in fact, in the hills it was a little bit more. The corn should be planted so that as it grows up it allows the sun all the way round the hill. When planted in a drill, it fills up all the surface with stalky growth, and it does not let the sun in to mature the ears.

*Question.*—Do you use the same space for the Dent and the Flint corn?

*Mr. Brewer.*—Yes. The corn crop in this country we consider on an average that the growing season is 120 days. For every day that that crop is growing it is adding to the wealth of the country $1,600,000. It is practically a new creation every day. There is no other work in the world that has a value as high as that.

*Dr. Wheeler.*—While this discussion has been very interesting, I fear we shall have to close it here to go on with our programme.

(Mr. Abel F. Stevens recites a poem entitled, "The Yankee.")

*Mr. Dunn.*—At this time I want to express to you all my deep appreciation of your kind co-operation in making this institute the grand success that it has been. I assure you that I deeply appreciate it, and in the future I shall impose upon you and ask you to go out and make other institutes successful. Dr. Wheeler was called away from the chair and asked me to introduce the last speaker of the day, Mr. G. E. Sevey, Editor, New England Homestead, who will speak on the value of New England corn exposition to New England farmers.

*Mr. Sevey.*—Mr. chairman, ladies and gentlemen, I am going to be brief, but I am going to talk so that you can all hear what I have to say. At the beginning, I want to congratulate Secretary Dunn on the very interesting meeting we had yesterday. It was the best meeting I ever saw in Rhode Island. It was better than the meetings we had last year. The meetings last year were far superior to those that had been in years preceding, so far as I know, covering eight or ten years; so you have every reason to be pleased with the proposition that you are developing down here in the agricultural way.

In regard to the corn exposition: Let me say they have talked to you about the practicability and advisability of raising corn, and feeding it to horses, cows, and chickens, and so forth. But they didn't say anything about the hogs. You might feed it to the hogs. Only last week I was talking to a man in Massachusetts who sold one carload of hogs raised on his own farm, fed on corn that stood on his own farm likewise. That was pretty good for a New England man. What is the corn exposition? It is a fixed fact that we are going to have a big New England corn exposition next fall. It is going to be held in Worcester on the grounds of the Worcester Agricultural Society. There is nobody making a penny out of it. Those who are pushing the thing are doing it at their own expense instead of getting paid for it. It was thought, about a year ago, that we ought to have a New England corn exposition in order to revive the interest in corn and get the farmers to raising more of that product. The thing was talked over, and last year it was decided that we should have a corn exposition for New England. We have organized our committee, and we have a president, vice-president, and secretary from each of the six New England States. In addition to that, there is a president and vice-president and secretary-treasurer of the New England exposition. Now that constitutes, so to speak, the organization, and that is a fair degree of progress. The committee has had two or three meetings and talked over preliminary matters and also they have appointed a sub-committee to decide upon matters, submitted to them. This sub-committee met in Worcester night before last and had a twelve o'clock session, and decided upon Worcester as the place, and the date will be, presumably, November 7th to 12th—Monday to Saturday, the whole solid week, unless the Association of the American

College of Experiments has their annual session before that time, but Dr. Wheeler believes that comes the week following. We are going to give a good many prizes. We have already better than $5,000 for premiums. That sounds very good for New England. One man has come up with a proposition to give $1,000. There are many others that are doing very well. The thing is going. Now, if the Rhode Island farmer to-day is to get in touch with the movement and reap some of the benefits, he should interest himself in this little talk. It will be a benefit to the Rhode Island farmer. In all things, a man is apt to get as much benefit out of a thing as he is interested in it. If you show an interest in this thing, back it up later. Secretary Dunn wrote me that you were going to get something out of it at these meetings down here. He said, "We are going to give one entire session to corn," and he said, "when this exposition, New England Exposition is pulled off, we are going to box up a whole lot of prizes," and adds, "we are going to label that box 'Rhode Island.'" I hope that is so, and you are going to get what you put into it, if you are interested in this case. Well, we never had anything like this in New England before. We have had something similar to it. Not long ago we had one of the biggest horticultural conventions ever held in New England. That was a great proposition. It stimulated and renewed our interest. We heard people talk about orchards and spraying them, and taking care of them. There are some people that are going to set out orchards and are going to take care of them, and going to get a good deal out of it. It is a going proposition. That is want we want to do with corn, get people to believe in corn so that we can raise more of the product on New England soil than we are now doing, when we are paying our good money to those fellows out west there. If we want to save that money, we have got to raise more of the stuff. We have got to raise the same stuff and save that price. That will help us a little, any way. What we get in this way will be a saving to us. We have every reason to believe that this corn exposition is going to help materially. I want to make one suggestion about the Rhode Island Experimental Union. I am proud of them. That is a bully good idea. There is just one criticism I want to make of the management for putting it back on a side line and making them have their session, in between meals. Why don't you put them in the programme? There were ideas brought out there at that meeting that were worth as much as this whole session. Put them on the programme. Give them a whole afternoon if possible, and let them talk those experiments over. That is what I suggest. I am glad to see the experimental union going ahead in the way it started out.

Now, about our prizes: I will just glance down here and say something about the prizes. We are going to have prizes. Here are some of them:

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| Single-ear prizes | $240 |
| Grange | 600 |
| Ten-ear samples | 800 |
| Ten-stalk class | 360 |
| Ten-ear sweepstakes | 65 |
| One-ear sweepstakes | 20 |
| Grange sweepstakes | 45 |
| Ten-stalk sweepstakes | 30 |
| Ten-ear samples for juvenile classes | 480 |
| Best acres | 300 |
| Special prizes including Bowker $1,000 prize | 1,500 |
| Miscellaneous prizes | 600 |

That foots up to more than $5,000. There will be over $2,000 in special prizes. We have divided New England into zones. It would be unfair to make the Maine farmer compete with the Rhode Island farmer, because he has a different season altogether. I won't take the time to give you the zones. As I said, I will be very brief. What can Rhode Island do with this proposition? What should it do in order to get the most advantage out of it? There are three to five avenues through which you can approach the proposition. The board of agriculture can help. It has started the ball rolling. Now, in this matter it seems to me it might interest the agricultural societies or agricultural associations in the State that they may be able to give more liberal prizes and devote special attention to corn this year, and then send the best exhibits to the New England Corn Exposition. Then the granges, every local grange, could get up prize competitions, and send their best competitions to Worcester. There are liberal prizes to be devoted for those. There are going to be Rhode Island special prizes admitting only Rhode Island corn. The premium list is all fixed up and will be in the press very shortly. This experimental union can also come in here and help out in its union and in pushing the thing along, and the argicultural college can also help.

Professor . . . is going to furnish a little bit of corn that he will send to plant this spring with the proviso that he sends back ten ears of it, and that will be shown at the exposition. That is something that the college can do. And I don't know why it would not be possible for you to go to the legislature, and get a little legislation for the growing of Rhode Island corn, and arrange for a special premium in that line.

*By the Chairman.*—There has been a question asked which has been handed to Professor Phelps.

*Prof. Phelps.*—The question is: Would there be more profit in keeping cows and raising your own calves, or in selling the young cows at the end of about six or eight months to have the best results in milk production, or turn them in for beef and buy more cows? That is a business proposition. It is very difficult to know how to answer it because there is such a difference in men, in their ability to pick out cows. On general principles it is very difficult to get a farmer to sell his best stock, so unless a man is very anxious for buying I think he can better afford to raise his own stock and carry them through from year to year as long as they can be made profitable, than to turn them every year and have to renew your herd practically. My own belief is that our milk-producing dairymen ought to combine with the dairymen back in the country on the matter of raising stock. The dairymen are not taking pains enough to reproduce their herd. They many times have good bulls, but their land is so high priced, the pasturage is so scarce, that they can not well afford to raise that stock, but they could combine with their brother farmers who live back ten or fifteen miles from those centers and have large areas and cheap pasturage. They could send their cows from there, and get the very best calves sired by a thoroughbred bull. They could do this with the different farmers with the understanding that they will take them at about a certain price when they produce their first calves, and just keep the herd renewed in that way. I think it is a great deal better for farmers to keep their own herd renewed from breeding than it is by purchase.

*Dr. Wheeler.*—I have felt that it is no longer necessary to go west to see the influence of a State Board of Agriculture, and to find a most efficient secretary. Our secretary has made a splendid success of this institute. I will ask those who feel the same way to rise.

(The audience rises.)

*Dr. Wheeler.*—Sometimes we have to wait for people to die before we feel full appreciation for them. I am glad we have shown our appreciation for the State Board of Agriculture and their secretary.

(The meeting at this point terminates.)

## LECTURE OF O. W. MAPES, DELIVERED AT FARMERS' INSTITUTE, KINGSTON, R. I., FEBRUARY 17TH, 1910.

I shall approach the subject of "Opportunities for Profit in Poultry on Eastern Farms," purely from a farmer's standpoint.

Indeed, I could hardly do otherwise were I to try. I can trace my ancestors back for seven generations in a direct line, to the time when the first Mapes landed on American soil, down here at Southold, Long Island, and every one of them was a farmer.

I doubt if a single one of them ever had any more acquaintance with college life than I have had, and I never saw the inside of a college wall before to-day.

I can tell a rooster from a hen, and can usually tell a five-point bird from a six-point bird, and that is about the extent of my knowledge of the fancier's art.

Fancy poultry, or poultry bred and selected with particular reference to some standard of perfection aside from the utility value, has had a long inning, and many fortunes and much fame have been won in that way. The tide now seems turning in the direction of utility as a standard of perfection, and eastern farms offer great opportunities for the present day poultryman or poultry-woman, for various reasons, some of which I will undertake to present.

Eastern farms as a rule are not large, yet there is room on nearly every one of them for a good-sized poultry plant without interfering to any appreciable extent with existing crops or industries.

This is particularly true of dairy, grain, and fruit farms, which will include the great bulk of farm lands east of the Alleghanies. My point is, that poultry should be added to, not substituted for, present activities.

Farm lands and farm homes call for the investment of a considerable amount of capital, if anything desirable in that line is secured, the interest on this being one of the first fixed charges to be met. If an added industry be profitably carried on without buying additional land, or maintaining another farm house, a distinct gain has been made.

Take the case of a manufacturing or mercantile business in the city.

The city lot on which the business is located, with the buildings on it, usually forms no inconsiderable part of the capital invested, and interest on this capital, together with taxes, etc., is a fixed charge which must be met regardless of how much business is done and also regardless of how profitable the business is. Show the managers of such a business how they can double their business and treble their profits with their present investment in site and equipment, or only a slight increase, and how eager they will be to embrace the opportunity.

Now, take the average New England or New York farm of 50 to 150 acres, and there is room on it to develop a modern poultry plant of 1,000 to 5,000 hen capacity, with scarcely any interference with the ordinary dairy or other operations. In more than nine cases out of ten, there is also room in the farm house for another member, without any additional outlay. This extra help may be the farmer's own son who is about to be attracted to a city situation, or a daughter, or a hired poultryman, or the farmer himself may undertake the work while still acting as overseer of the usual farm operations.

It seems to be well settled that unlimited range is not as desirable or necessary as it seemed only a decade ago.

The old idea that small flocks of one to two dozen each were necessary to insure success has been exploded higher than a kite. With larger flocks, or units, the item of labor and of buildings is materially reduced. The man who cannot succeed with an acre of land for each thousand hens is sadly behind the times, and it need not be the most productive land either.

If, however, the most productive land on the farm offers the best inducements as to convenience and economy of labor, do not hesitate to appropriate it.

I speak with authority on this point.

When the microbe of the hen-fever first got a lodgment in my brain, twenty years ago, I was led to believe that small flocks on the colony plan was the only safe way to embark in the poultry business. The result was that I devoted a lot of rough pasture land to the hens, placing forty hens in a flock and the colonies far enough apart to give 100 hens to the acre. Some of you may remember hearing of the man who kept "Hens by the Acre."

As a result of that action I presume I have done enough walking over that stony ground in caring for my hens to almost or quite circle the globe, much of which I now see to be useless.

Select, if possbile, ground that is convenient to the other farm buildings, and convenient to your water supply. The work of supplying fresh water regularly and often to a flock of hens is a large factor on most poultry farms, either large or small.

Water will run down hill itself, and there is no excuse for wearing out one's self in carrying it about on a modern poultry plant.

A tank should be located at the highest point of the grounds occupied by the buildings, with sufficient capacity to fill all the drinking-fountains. Connect this tank with a small heater such as is used in all pipe systems, so that the water in the tank can be warmed in cold weather. Now, lay an iron pipe above ground and on a gradual decline from the tank to the first flock on the system, and continue it still on a gradual decline to the last and lowest flock, provided all cannot be placed on a level. The drinking-fountains can then all be filled with cold water in summer and hot water in winter by simply turning a faucet. When the last faucet on the system is reached in cold weather, it can be allowed to empty the whole system of pipe and tank, while still warm, in order to obviate the danger of freezing.

With such an arrangement for watering, and the dry-mash system of feeding, an able-bodied man need not hesitate to undertake the care of four thousand or five thousand hens, provided his flocks, or units, are not too small.

I am testing an entirely new type of open front house this winter, adapted to a flock of 200, that I think very favorably of. It is durable, having concrete walls, cement floor, and a good durable roof.

It allows three square feet of floor space per hen, and costs less than fifty cents per hen. It is well calculated either for free range, for enclosed yards, or for close confinement within the house during the entire year.

Two hundred hens that were past two years old laid enough eggs in forty days to pay for the house complete, at market quotations.

I have a photograph with me that can be seen by those who wish to see it.

Another strong feature in favor of farm poultry is the great value of the extra fertilizer thus produced on the farm, and the better farming which a full supply of plant food will inaugurate. One of the crying needs of the times is a large yield per acre of all the staple crops. The alarming increase of our urban population, and the gradual decrease of our surplus of food products for export, has caused the alarm to be sounded, in many quarters, of danger ahead.

The farmer who has an abundant supply of poultry droppings, well preserved against the time of need, can snap his fingers in the face of the trust which is said to control the nitrate of soda supply, and if he also has a good supply of stable manure on a dairy farm run in connection with his poultry, he will be independent of all fertilizer dealers.

I never knew what it was to feel that I could feed every crop on the farm up to its full capacity before I combined poultry farming and dairy farming. I sometimes sell part of the hen manure to a nearby tannery, because I think that the price, of thirty cents a bushel, invested in commercial fertilizer, or agricultural chemicals, can be used to better advantage. The proceeds so used gives me an abundant supply of all the plant food I care to use.

Just stop and think what that means to eastern agriculture, if such conditions prevailed generally on our eastern farms. You would hear no more of the abandoned farms of the east. So long as conditions warrant the purchase of western-grown grain for egg production as they do at present, plant food drawn from western soil and western skies can be transported to our eastern farms, causing them to "blossom as the rose."

There seems to be some quality about hen manure that gives it a value out of all proportion to its chemical analysis. This is probably due to the fact that it is more available.

I have always found the best results from its use where sawdust and shavings have been freely used as an absorbent, being careful not to allow any fermentation before its application to the soil.

It can be put in commercial form by kiln-drying it. I have with me a sample which I believe retains its maximum strength.

I live in a great dairy county, and near me there is a factory where the carcasses of dead cows and horses are collected and converted into soap grease, bone meal, tankage, etc. This sample is from hen manure that was allowed to freeze on the tables as made, and the first warm day I collected a load of it, hauled it to the factory, and had them run it through their steam dryer where their tankage is dried.

Thirty bushels of the fresh droppings made 700 pounds of as fine commercial fertilizer as one often sees.

Any one who has watched the market quotations for eggs for a number of years back cannot but have noticed the wide margin in the value of western and southern eggs, which constitute the great bulk of the supply, and the nearby hennery eggs.

This is often as much as twelve cents a dozen or more, and of itself makes a handsome income for the man who has a few thousand well-cared-for hens.

I do not know that a new-laid egg has so much more real food value than a good storage egg, but our eastern cities are filled with people who cater largely to their palates, and have the means to gratify all of its desires, whatever the cost; hence the high prices paid for strictly new-laid eggs, when good storage eggs and western and southern eggs go a-begging at a price much lower.

Most of you, I judge, have heard or read of the small flock of A. F. Hunter, from which he sold enough eggs alone the last year to pay for all feed and leave a balance of $3.49 per hen. I have never been able to get as big prices for my eggs as some report, yet in comparing prices, month by month, with Mr. Hunter's sales last year, I find that if he had sold his eggs even at the prices I was able to get for mine, he would have had a profit of just a dollar more per hen, or $4.49 per hen.

I dare not attempt to give any estimate of what a farmer who adds a few thousand hens to the equipment of his farm may reasonably expect in the way of profit.

It is said that figures do not lie, but I fear that hens are an exception to that rule.

The amount of loss and disappointment that have resulted from trying to make figures and experience correspond, when you put hens into the problem, is appalling.

Much of this has been due, I believe, from men, and women too, with no experience in country living, and no other source of income, embarking in the business with the idea that any one with good muscles can run a farm. The result is almost a foregone conclusion. They get to the end of their rope before they get the necessary knowledge and experience.

On thousands of our eastern farms these conditions do not prevail. The farmer and his family are familiar with country life, already have more or less knowledge of hens and their habits, and also have their usual source of income, which need not be interfered with to any great extent. Such a person has tenfold greater chances of success than one who has been used to city environment previously, and must cut loose from the usual source of income entirely in order to embark in the poultry business.

In looking back over my experience of twenty years, I can see where a good deal of progress has been made.

The introduction of the dry-mash system of feeding makes possible a great extension of the amount of poultry which one person can properly take care of.

The much larger flocks, or units, which it is now known can be successfully handled, marks another step of progress.

I visited the farm of a Mr. Case at Clover Hill, New Jersey, last October, and was shown a flock of 500 mixed R. I. Reds and White Leghorns, all in one flock, which confirmed my long cherished belief that larger flocks will be an established custom in the near future.

Mr. Case's daughter was gathering the eggs at the time of my visit, and I was shown the egg-record, for the eleven months and over just past, hanging by the door. I have regretted ever since that I did not take time to copy at least the footings for each month. I remember that there had been from 350 to 375 eggs a day laid by the flock of 500 hens on many, many days, the banner day being 413.

Probably all of you have heard of the Corning egg farm at Bound Brook, New Jersey, where 1,500 hens were kept last year, all in one flock, and a profit realized of $6.41 per hen from market eggs alone.

I presume that there are others present beside myself who know from actual experience how hen-lice can tantalize both the hens and their attendant. Any one who has rolled on his pillow, as they meander over the skin or through hair or beard, has my sympathy.

I have lately used a hen-lice-wax on all my perches, which does away entirely with the weekly or bi-weekly battle against this tantalizing pest.

It is melted, and applied hot to the perches, once, in early spring with a paint brush, and the whole problem is then off your hands for a whole year. The hot wax fills every crevice where the lice can hide and breed during the day and stays there. It does not evaporate away like liquid remedies.

Learning to set a hen looks like a simple matter to others besides "Josh Billings," yet it took me nineteen years to learn how to do it.

I have long known that the average hen is best satisfied to attend to business in the nest where she has been in the habit of laying. How to satisfy her desires in this respect with safety, in a room where other hens stand ready all day to add to the number you have intrusted to her care, was the problem.

With the dry-mash system of feeding, it makes but little difference, I find, whether the daily allowance of mixed whole grain is given at one feed, or at two more feeds.

This is particularly true in springtime, when hatching is mostly in order. Neither does it make much difference what time of day the grain is thrown to them, so long as it is done regularly. Many of you have doubtless seen and used the type of nest consisting of a row across one side of the sidewall, of proper height so that the eggs can be gathered without bending the back. These have a sloping cover which prevents the hens from alighting on top of them, the entrance to the nest is an opening comprising the upper half of the front side, and a footboard runs the entire length of the row of nests, upon which the hens can alight as they enter or leave the nest. This footboard is hinged, so that when it is folded up against the front of the nests, it closes the entrance, leaving only a two-inch space at the top for ventilation.

After nineteen years it occurred to me that just under that row of nests there was room for another similar row of nests, and also a footboard in front of it, the one sloping cover answering for both rows. A house containing a flock of 300 hens was thus equipped. I then waited until all the hens were done laying for the day before the daily allowance of grain was thrown to them. They had the dry-mash before them all day. The upper tier of nests was devoted to sitting hens, and the tier below it to laying hens, the footboard in front of the upper tier being folded up most of the time. This allowed the setters to attend to business during the day undisturbed by the 300 hens, which were in plain sight through the two-inch aperture.

By 5 P. M. the day's eggs were all deposited in the lower row of nests. At this time I visited the flock and gathered the day's eggs, after which I folded the lower footboard up against the front, thus closing the entrance to those nests, and dropped the upper foot-board into position, thus opening the entrance to the upper nests. The day's allowance of grain, about one pound for each eleven hens, was scattered on the floor, and any of the sitting hens that failed to respond to the supper call were lifted carefully from the nests and thrown to the floor. There being plenty of time yet before dark for them to drink, take a dust bath, and visit the dry-mash hoppers if they wished, I got as good hatches as one could wish.

After the first two or three days nearly all the hens learned to come off without help as soon as their nests were opened.

When locking up for the night the upper nests containing the sitters were again closed and the lower ones opened. In this way the hens practically set on the same nest where they had been laying, with no disturbance from other hens.

Aside from the fact that broody hens set their own dates rather than let their owner make the date, chicks can be hatched in this way as cheaply as with incubators, and with less labor.

I used insect powder freely on the sitting hens, and kept many of them at work six weeks instead of three weeks, and last hatch actually being better than the first.

To all tides there must be both an ebb and a flow, or else an equilibrium will not be maintained. There are many indications that high tide has been reached in the flow of population from farm to city, and that the reverse tide is now setting in. The present high cost of food products is a mighty factor influencing this tide of humanity, which has been steadily bearing the cream of our sons and daughters cityward. In drawing the tide back again to the farms the hen is to be one of the chief attractions.

Her possibilities are as yet but dimly perceived. There are but two examples in nature of a complete food. One is the product of the hen, and the other is the product of the cow. Let us institute a few comparisons.

It takes a good cow to produce an average of ten quarts of milk a day for the year. This calls for four days feeding for each forty-quart can of milk produced. Twenty pounds per day of dry matter of grain and forage is a fair allowance for your cow, or 80 pounds for a can of milk. The can of milk is barely worth $1.40 on the farm.

An equal amount of food will feed a hen a year. The ten dozen eggs which she should produce are worth more than double the value of the can of milk in most sections of our eastern States.

Take another view of it. Milk is obtained in an extremely perishable condition. It is exposed to all sorts of microbes and bacteria, and must be used quickly in order to have it either safe or satisfactory. For this reason its production and sale is confined to areas close to the point of consumption. Milk is so susceptible of decay and contamination that it must be produced under conditions of great cleanliness and care, in order to satisfy the demands of city consumers for a sanitary article. This adds to the expense.

It is also so perishable that it must be delivered daily to the consumer by special delivery.

Eggs, on the other hand, can be sent to consumers through the ordinary channel of grocer's supplies. In my own home city of Middletown, New York, at the present time, dealers are paying producers four cents a quart for milk, and charging consumers seven cents per quart.

Grocers are paying thirty-six cents per dozen for eggs, and charging consumers forty cents per dozen.

In the case of milk the farmer gets 57 per cent. of the consumer's dollar, while in the case of eggs he gets 90 per cent.

This is a great difference in favor of the hen. Nature gives us the complete food of the egg, done up in a neat package, surrounded by a tough wrapping, and the whole is enclosed in a neat case that is literally "packed" with meat.

This package of food may be exposed to weather conditions, etc., without particular harm, that would make milk useless for human food, ten times over. In this connection I want to say a word in relation to infertile eggs for market, or "germless eggs" as they are coming to be called. The delicate morsel of food which nature packs inside an egg-shell will stand a lot of abuse, and exposure, so long as it is only a package of food. When we allow a germ of life to be enfolded within the package, we have an entirely different proposition, and there is danger ahead.

A little exposure to the heat of a broody hen's body, or to summer conditions in a hot freight car, or a store window, will start that germ of life into activity, and then when the source of heat is removed we have a coffin instead of an appetizing bit of food.

The moral is to produce nothing but infertile eggs unless they are to be used for hatching. When this practice becomes general, much of the grain, etc., that is nowbeing exported from American farms can be turned into eggs with great profit and sent to any corner of the earth where the wheels of commerce turn.

Corn has been crowned king of American agriculture. I predict that there are those in my audience who will live to see the day when the hen will be crowned queen, and sit beside the king, or, perhaps, wield the sceptre of ruling monarch.

# PRESENT DAIRY CONDITIONS.

BY P. M. HARWOOD, DAIRY BUREAU, MASSACHUSETTS.

That dairying is a declining industry in both Massachusetts and Rhode Island is a fact that cannot be denied. According to assessor's returns, Massachusetts had, on May 1, 1890, 200,000 cows, while on May 1st, 1909, there were but 168,000, a decline in 19 years of 32,000 cows—practically 1,700 cows per year.

What is the matter? This is a question of great importance, not only to producers but to all consumers as well. The answer is that the farmer does not get enough for milk. It is also true that the average consumer does not now and rarely ever has paid for milk what it is worth as a food as compared with most other animal products. The price he has paid and is paying has become a habit. And like all habits is not easy to change. He thinks he cannot afford to pay more for milk than he now does—but in this he is mistaken. Figured on the basis of the per capita consumption of milk in the United States the raise of one cent per quart would mean but $1.20 per year per person—a mere sacrifice of twelve ten-cent cigars or any other $1.20 luxury would pay for the increase. And this increase of even one cent a quart to the dairymen, if they could get it, would place most of them on a sound financial footing. It would enable some of them at least to be in a position where they would not lose money even if they did not make much above expenses. But to make the business worth while they ought to get even more than a one cent raise.

The consumer should be educated to the exact food value of milk and this and all other foods should be sold, other things being equal, upon that basis. But, of course, the great law of supply and demand enters into the question of milk, as well as all other commodities. It may perhaps be worth while to consider a few of the reasons why milk has been sold in the past so much below its real food value. We shall have to place some blame upon the farmer himself. As a rule he has not kept accurate accounts and has not really known exactly where he stood. A man who fails to keep accounts in almost any other business than farming would soon go down and out. Why not the farmer? Simply because he can rob his farm for a few years and thereby withstand the coming crisis longer than those engaged in other business. The method of committing financial suicide via the farming route is slower, though no less effectual in the end, than by almost any other known means. It nevertheless entails much long drawn out hardship and suffering on the part of the farmer and his family—as thousands of farmers' wives, sons and daughters can testify from experience, and hundreds of unpainted farm houses, dilapidated farm buildings, tumbled down and brush-bordered farm fences dotting the landscape in rural communities stand today as monuments testifying to the fact.

There are at least two reasons why some dairymen do not keep accounts: first, because there are no accounts more difficult to keep; and second, the average farmer becomes so much exhausted physically through long hours and hard work that he has little time and practically no energy left for the task of bookkeeping—a mistake it is true, but nevertheless a fact.

Then, too, milk has often been produced as a by-product, as in the case of nurserymen, market gardeners, fruit growers, etc., or the business has been supplemented by other income as from wood, timber, etc. Fancy farmers, so-called (men with well established city incomes) often take up dairying for pleasure and run it, not as a business, but as a "fad"—a recreation—knowing well that whatever deficit occurs can be made up from other sources. Another competitor comes to the average American dairymen who wants to live, educate his family and become an active, public-spirited citizen in the shape of the foreigner, who with his own hands, and those of his wife and family, work hard, denying themselves of everything except common school education for the children, and who, with that much done, are content to die, having lived more commendably perhaps than some, but still falling short of what we expect of the best American citizens.

There has been and still is great lack of confidence and coöperation among farmers. They are too prone to jealousy. On the other hand, the slick politician, "gold brick" man, and promoter too often finds him a most willing listener and ready victim. He does not take time enough for careful consideration of the problems which most interest him, sometimes allowing prejudice to usurp judgment—which reminds me of the story of the man who, having obtained a college and ecclesiastical education, entered the ministry. He made a good minister but was unable to obtain a satisfactory salary. He, therefore, gave up his work and entered a medical school, from which, in due time, he graduated and practiced medicine. He made a good doctor, but still was dissatisfied with his income. Again he gave up work and this time studied law, was admitted to the bar, made a successful lawyer and plenty of money. On being asked how be accounted for it, he replied, "People will give more to have their own way than they will to save either their lives or their souls."

The demands of the times for clean milk produced under better sanitary conditions have added materially to the cost of producing and handling milk, and the logical conclusion is that the public should pay for it. The American public mind is to a certain extent warped. It is constantly looking for and expecting something for nothing. The merchant is in a position to meet this demand without sacrifice by selling imitations at a good profit, while still calling them "bargains." The milk producer cannot do this—but the consumer *is* getting a bargain, even in milk of low average analysis for, as was stated at the outset, he is not paying what the milk is really worth as a food.

In recent years there has been unwarranted prejudice against the use of raw whole milk, brought about by reckless newspaper statements concerning the same. Talk that should be confined to the lecture room in the medical school has been spread before the public in scare head lines and cartoons which have tended to poison rather than enlighten the public mind upon this important subject. The fact is there is no milk so good, so nutritious, so well adapted as food for children and others as raw whole milk from healthy cows—milk that has been produced, drawn, cooled and bottled under sanitary conditions, and has been placed at the door of the consumer in the shortest possible time.

There are many scientific theories that are well enough in themselves, but are not of much *practical* service to mankind until they have been well mixed with good common sense. Theories regarding milk are no exception to the rule, and this applies to all phases of the milk question. Nature has provided that raw whole milk be the food of infants. No natural means for its pasteurization or sterilization or cooking or any other doctoring of milk have been provided. These methods are left to the ingenuity of men and their use is found largely in rectifying or renovating what has already become contaminated. Some theorists go so far as to say that all milk for the city supply should be pasteurized. I say no, rather that all milk should be so clean and cold that it will keep until used without pasteurizing. It is possible to produce such a milk nearby a city or town market. Local producers cannot afford to compete with distant out-of-state producers in the general market. The local man must make a cleaner milk and convince the consumer of this fact and get a better price for it. Whatever salvation there is for him in the business lies in this fact. How can he do this? Should he make certified milk? I think not, for it will cost him too much and the market at the necessary price is too limited. But a sanitary milk at a reasonable advance over average market milk is a possibility. "Local milk for local people" should be the slogan cry of your dairymen; and "the short road to clean milk" should be the path he should follow. He should keep cows and stable reasonably clean, should avoid milking when dirt is floating about the stable and the milker's arms and hands and those parts of the cow coming directly over the milk pail *should be made scrupulously clean* at milking time. This carefully attended to, a partially covered pail should be used and the milk, while yet warm, filtered through absorbent cotton into a mixer and either run over a cooler or placed in cans to be submerged in ice water—in which latter event the milk should be occasionally stirred with a tin-covered paddle. All implements used in contact with milk should be thoroughly cleaned and sterilized immediately after use and kept perfectly clean until used again. In the successful handling of milk, cleanliness and cold are the two things to remember. Any person who can get milk thus produced should be willing to pay a fair price for it.

I believe that a large portion of the troubles that come to people in the way of contagious diseases are due to unsanitary conditions of the home. Care of milk in the home is, therefore, important. In this the following rules may be of service.

## RULES FOR THE CARE OF MILK IN THE HOME.

1. Take in milk and cream as soon as possible after being left at your door and place in the refrigerator.
2. Keep milk and cream cold until ready for use.
3. If ice cannot be had, wrap the bottle in a wet cloth and stand it in a dish of water by an open window, out of the sun. Evaporation of the water will cool the milk.
4. Keep milk and cream covered until wanted and in the bottle in which it is delivered. In open bowls or pitchers, it will absorb odors from food and collect flies and dust.
5. Pour from the bottle only what milk or cream is needed for immediate use.
6. Milk or cream that has been warm should never be poured back into the bottle of cold milk or cream.
7. Utensils used for milk should first be rinsed with cold water, then washed with warm water and soap or washing power, and

finally rinsed with boiling water, thoroughly drained and allowed to become cold before being filled with milk.

8. Have a separate quart of milk for the baby. What he does not use others may have.

9. Wash and return all milk and cream bottles daily.

10. No person ailing or sick with contagious disease, or one having the care of such person, should have anything to do with the care of milk or of milk utensils.

In 1906, 114,000,000 quarts of fluid milk were shipped into Boston, by rail, while in 1909 there were but 108,000,000 quarts. The population of Boston in 1905 was over 6 per cent. more than in 1900, showing a gain of 1⅕ per cent. per year. At this rate of increase, if continued through 1907, 1908 and 1909, with the same milk consumption per capita there should have been shipped into Boston in 1909, 118,000,000 quarts of milk or 10,000,000 quarts more than in 1906. What has taken the place of this 10,000,000 quarts of non-reduced milk? What indeed but reduced milk in such forms as "condensed," "evaporated," "concentrated," "powdered," etc.— products of other states. And the worst part of it is they are allowed to be sold here without the restrictions that are imposed upon the milk sold from our own dairy farms. Is it not high time that the manufacturers and dealers in these alien products be made at least to conform to the same conditions as regards the quality of their goods that are required of producers and dealers in raw whole milk or fluid skim milk? This and every other condition prejudicial to local milk production should be removed by proper legislation or otherwise and it cannot be done any too soon for the welfare of our people.

The importance of maintaining and developing local dairy industry is much greater than it seems, at first thought. New England soils, as a rule, through fires, improper cropping, etc., have been greatly robbed of humus as well as fertility. Elements of plant food can be restored by use of commercial fertilizers, but not so the humus, essential in the conservation of soil moisture. Green crops are too valuable, as a rule, to plow under on any large scale, and therefore our main reliance must be barnyard manure. If cattle husbandry is to go, where else can we look for the supply of humus so necessary in bringing about that soil improvement required at this dawning era of intensive agriculture?

Dairying once placed upon a profitable footing would go a long way toward solving this problem of restoring essential fertility to our soil and ultimately give to consumers abundance of food at reasonable prices. Viewed from a broad standpoint, therefore, the dairyman's interests are hardly more vitally affected by this question than are those of the consumer. At the present time the dairyman needs relief and should get it *from everybody in the interests of everybody.*

# REMUNERATIVE OUT-DOOR OCCUPATIONS FOR WOMEN.

ADDRESS BY MARY E. CUTLER.

In the Metropolis of Germany, in the reception room of our historian and consul to Germany, Mr. George Bancroft, stood a little Yankee maid, talking with that grand old General, the greatest perhaps that Germany has ever known. And upon her reply, quickly given in in defence and patriotic loyalty, to her country, the old *Chief Marshal* of the German Empire-Father Von Molthe, (as the soldiers of the Fatherland used to call him), replied in the ever to be remembered words, "That is right, little maid, always stand by your convictions of what is true. Battle for them, and see to it that you go into the battle, with the thought of success."

When I accepted the invitation to address this company assembled here this afternoon I did so, in the conviction, that it was my duty to do this in behalf of agriculture, horticulture and floriculture, to which I am so loyal and for the glory of which if necessary, I am always ready to battle, with the words of old General Von Molthe to sustain and endorse me forever more.

## Remunerative Out-Door Occupations for Women.

It is a matter of common remark, that the second half of this century has witnessed a tremendous extension of the sphere of women's work. While clerical and stenographic employment on the one hand, and factory labor in the other have furnished the chief field for this extension, still almost every department of business has experienced the infusion of the new element, even the professions opening their doors, and women doctors, lawyers, and clerygmen becoming by no means uncommon. Agriculture is no exception to the rule. The world has not heard so much about the woman farmer, but she exists and flourishes, indeed is increasing and multiplying upon the face of the earth. The violent manual labor involved in field work possesses no attraction for American women, but in many branches of farming, horticulture, floriculture, poultry raising, etc., women occupy a large portion of the opening.

Fifty years ago no occupations were open to women, except cooking, sewing, teaching and factory work. Few women were sufficiently educated to teach. Those who were, received from $4.00 to $8.00 a month and "boarded round," while men for the same service were given $30.00 a month and board. In that day not even woman herself had so much as a dream of entering the profession of law, medicine and theology. When the genius of Harriet Hosmer impelled her to take up sculpture, she travelled from one end of the country to the other, begging for an opportunity to make the necessary study of anatomy. When Elizabeth Blackwell determined to consecrate her life to medicine, not one of the standard medical colleges would admit her as a student, and society ostracized her.

The close of the 19th century finds every trade, vocation and profession open to women and every opportunity at their command for preparing themselves to follow these occupations. A vast amount of the househeld drudgery that once monopolized the whole time and strength of the mothers and daughters has been turned over to machinery. A money value is placed upon the labor of women. Woman is no longer compelled to marry for support. In the world of literature and art, women divide honors with men, and the civil service rules have secured for them thousands of remunerative positions under the government. What the woman of the 20th century will be, the richer opportunities certain to come, will make her a being as much nobler, higher, and more gifted with every power for good, as the women of to-day is superior in these qualities to her sister of a century ago.

Perhaps no department is better suited to woman's work, than is that commonly known as Glass Farming, which is especially adapted to women, for several reasons. First, it necessitates careful advance calculation, a matter in which women excel. Second, the physical labor involved is comparatively light, and so fitted to one whose strength is not robust. Thirdly, in it there is room for much artistic taste and discrimination, certainly woman's specialties. Glass farming, that is, the use of plant houses, greenhouses, pits, frames, etc., is an ancient idea. We find mention of it in the Latin writers of the first century, Martial, Columella and Pliny, and we have no reason to think that this was the beginning. But until recent years glass farming has been regarded as a mere luxury, pastime for the wealthy, rather than a practical method of supplying the world with necessaries.

During the very years, however, in which women were entering the field of industry, this conception changed, and for the first time glass farming began to be regarded seriously as a department of Agriculture. Raising flowers in greenhouses for market is a profession for which women are proving themselves especially adapted. It is a business that has to be learned like any other; but given a little experience, added to natural qualifications, such as perseverance, energy, and common sense, success is sure to follow.

With $500.00 and an acre of land a practical women of good health, can earn a living for herself from the beginning and keep enlarging her plant all the time besides. Given an acre of land, the first requisite is, of course, a greenhouse. A modest one can be built for $350.00 and a rough heating apparatus put in for $150.00. The cost of plants and seeds are slight, as the large firms make easy terms for the trade, and the other expenses, such as tools, fertilizers, cold frames for starting plants, etc., would amount to little on so small a scale. One great advantage is that the returns are quick. With a greenhouse in running order by the first of September, crops of several kinds can be marketed before Christmas. The chrysanthemums come first, then follow violets, carnations, tulips, hyacinths, narcissus, calla and Easter lillies, spirea, roses, etc. The secret of success is to utilize every inch of space. In a vegetable house, the tables can be filled with lettuce, or cucumbers, or tomatoes, while rhubarb and mushrooms can be grown on the ground underneath.

A good head for planting is a necessity, as no time must be wasted between crops. It is necessary to know what kind of fertilizer suits each crop best. Some thrive best with bone meal, some with leaf mold, or pasture turf. There are special fertilizers for special crops. The location of such a venture as this is more than half its success. At first thought one would think that the neighborhood of a large city was the best place, but this is not necessarily so, as one is at the mercy of commission agents and middlemen. The best place is a small town or community of prosperous people, retired tradesmen, who do not travel, but make their homes there all the year. Flowers in a prosperous community you do not have to market—customers will come to you for them. Parties, receptions, weddings are constantly taking place. The profit is in decorating, and set pieces, rather than in cut flowers. A great advantage in this profession is that there is so much room in it for originality and taste. A branch in which a great deal of money can be made is in the sale of plants. All kinds of bedding plants are wanted in May and June for lawns, parks, cemeteries, cottages at the seashore, vases and wayside nooks. Pots filled with two or three California violet plants in bloom, brought seventy-five cents in Boston this winter. Pansies are in demand in their season. Ferns, palms, and orchids grace your dining rooms, churches, etc. The filling of window-boxes, designing new effects in jardinieres and hanging baskets is a line in which a woman can be very successful. The rose in all its colors is one of the most profitable flowers to grow under glass. The demand is great and people must have them. It was about 1874 that the first decided ground swell in floriculture was felt. All eyes being turned toward the rose. The varieties then grown were far from satisfactory; larger flowers and a better grade were demanded, and in a short time the growers made gigantic strides in their efforts to produce new hybrids.

The carnation, the violet, and each flower in its turn absorbed the attention of the floriculturist, which eventually resulted in the perfection of growth, coloring, and many varieties. In the last quarter century, we have seen introduced the Bermuda lily, Crozy Cannas and their seedlings. We have seen roses propagated during the summer and distributed by millions and tens of millions, by mail and express. We have seen the home grower successfully compete in budded roses with the foreigner.

Cheap and good land, with energy, have beaten cheap labor. We have had asparagus, plumosus and springerii. We have had the crimson rambler rose. We have the bay trees dotting our streets, we have seen great botanic gardens, like the Bronx, brought into being. We have the wonderful development of the Arnold Arboretum, the metropolitan system of parks in Boston. We have seen the Back Bay fens converted from a swamp into a garden; and I desire to say that in all which tends to the advancement of horticulture along its best and broadest lines, the Massachusetts Horticulture Society has played and is playing a most prominent part. The raising of roses is a much more difficult branch of the business, and should be taken up only after a certain amount of experience. When this is gained considerable money may be made in it. Did you ever stop to *think* when and *how* the beautiful flowers were grown? The flower business has great prizes to offer if one is of an investigating turn of mind. The large amount of money that was received for the Mrs. Lawson Pink is inspiring me to think of going into the business. It is wonderfully interesting to create new flowers, to make those bloom double that have heretofore been single, and to paint the lily a new color; it is really scientific work. It is adapted to women and so profitable has it generally proved that it is strange so few have taken it up. If a woman decides to take up flower and vegetable culture as a profession, she ought, if it be possible, to fit herself for it by a previous course of study in some agricultural college; she should be familiar with botany and chemistry. If she has a chance to travel and study the flora of other countries, she has the greater chance of making a name for herself. Miss Myra Dock of Philadelphia is an illustration. She was sent out by the Park Commissioners to study the park system in Europe.

Trees should be studied as well as landscape gardening. Perhaps some day women may be park commissioners, and parks to-day show the need of some new element in that department of civic life.

The demand and supply for carnation pinks never was so great as at the present time. Women are raising these all over the country with great success.

In these progressive times the handle of the agricultural tool is coming to know the grasp of the woman's hand almost as well as the needle or the broom, and many women are making reputations as farmers of progress. Among the agriculturists are wives, widows and maidens, women who have begun with small means, women of wealth who have entered the ranks for the pleasure they could get out of it or for philanthropic purposes. One and all are bright, intelligent women and the large majority are educated and cultured. Some are in partnership with men, others own and manage farms for themselves, while many manage farms for other people. Careful investigation shows that these women have distinguished themselves by their skill and executive ability. In some important specialties, such as flower seedgrowing, poultry raising, fancy dairying, and the growing of raisins and nuts, they have been successful pioneers. Their farms are scattered all through the country, on the uplands and in the lowlands, among the valleys and even on the mountain sides. They are found in the largest numbers in Maine, New York, Pennsylvania, Minnesota, Illinois, Ohio, Indiana, Iowa, Kansas, Michigan, Wisconsin, Nebraska, California, South Dakota, Nevada, Arizona and Wyoming. Some are cultivating their thousands of acres, using their steam engine as a plowman. The majority conduct farms of more than 100 acres, while a few are contented with a single acre, depending on the spade and hoe. Women lead in poultry culture. They began a decade ago. It had been an uphill struggle against prejudices. Few it is said make a failure of it and the time they claim will soon come when women will control the industry here in America. Many claim it pays a greater interest on the investment than any other branch of farming. The notable success of the few New England women farmers proves conclusively that education and brains are needed in the business.

Two young women in Compton, R. I., are examples of college graduates going directly into out-door work. These women saw a chance to make money by supplying Newport's epicures with dainties. Their spring lamb, young geese, and hot house grapes bring fancy prices, and there isn't an "ology" that they studied, but contributes in some way to their success. In studying over New England's abandoned farms to see what they need to bring them back to fertility and prosperity, one might do worse than advise giving these deserted acres into the care of women. A flourishing little farm of three acres on the north end of Lake Champlain produces yearly more than two and a half tons of honey and 1,500 ducks, besides quantities of fruit, which is marketed at the neighboring summer hotels. It is owned and run by Miss Frances E. Wheeler, for several years a stenographer and typewriter. It seems quite a change from a stenographer's place in New York to the ownership and superintendence of a duck and bee farm. Yet in looking backward the sense of harmony deepens between the two occupations. I have grown to understand that it does not so much matter *what we do* as *how we do it,* that the qualities required for a successful stenographer are equally necessary for a duck and bee rancher. In both callings, if success is to be attained, ignorance must be overcome by perseverance, tact and common sense. After several years of office work, Miss Wheeler's hands became disabled and the problem arose, how to save the little family home at Chazy, N. Y., with its bee plant. Many women have been successful in growing tomatoes in hot houses, being started in the fall from seed. For the house-grown product the prices are high and they continue to yield good profits to the grower until shipments begin to arrive from the south. There are but very few varieties suited for forcing and among these are the early Essex and Lorillard.

It may be of interest for you to know where this plant, the tomato, was first grown. The story is told, that a good many years ago a man recently arrived from the Bermuda Islands was committed to a Pennsylvania jail. He had with him a few seeds which he planted in the jail yard, but before the plants came to maturity he was discharged. The plants bore a strange fruit, which as it ripened, changed from green to red, and was greatly admired by the prisoners. The matron of the jail, sure that it was poisonous, cautioned all the inmates against eating the fruit, but as she desired to save specimens of it, she planted some of the seeds the following spring, and just as the fruit was well ripened, the man from Bermuda revisited the jail and asked to see the plant. He called for pepper, salt and vinegar and to the astonishment and horror of his spectators, ate the fruit with a relish. Having finished, he told them that this strange fruit was a tomato, or translated into English, a love apple, and that it was wholesome and nutritious. The seeds were therefore carefully preserved and distributed among friends and neighbors who cultivated it as a curiosity, but it was long years before prejudice gave way to appetite, and this now most popular fruit came into general use. Even now many people remember it as an ornamental rather than useful plant. Probably more tomatoes are canned than any other fruit or vegetable, as they can be served in so many ways. Eaten raw with salt, pepper, and vinegar or with a salad dressing, plainly stewed, in sauces, soups, preserves and pickles. The tomato is ever ready for an emergency, and the provident housekeeper is sure to have it in reserve. One of the most successful tomato growers I know of is an English woman; they are grown to perfection, and she always finds a ready sale for them at some of the leading hotels in Boston. Under the tables can be seen beds of mushrooms and she is equally successful in growing that vegetable, giving all her time to this work.

It was a good idea conceived by the Massachusetts Horticultural Society in offering prizes to the scholars for school gardens and school herbariums. The cultivation and observation of plants in school grounds and instruction upon them being of high educational value. Native wild plants, such as ferns, grasses, asters, golden-rod, violets, native shrubs and economic plants, grains, vegetable roots and leguminous plants, must be the stock of the gardens. The children are approaching the coming season with unbounded zeal and enthusiasm. This tends to cultivate a higher taste for the beautiful. One essential to success in gardening is a love for it; but given this and intelligence to first plan carefully and afterward carry out plans with perseverance, and gardening will be found a successful, pleasant and congenial occupation. Women are beginning to think about these things. Many of them could do much better at floriculture, than to work for the very low wages paid for woman's work in the cities. It is not so much labor and muscle nowadays, as brains and machinery. Don't do your work first and your thinking afterwards, but think and plan first and then work.

It is said that the wives and sisters of the soldiers in the 20th Kansas Regiment, when in the Philippines, went out into the deserted fields to work. The crops needed attention and there was no one else to give it; as nearly all the members of the regiment were farmers, there are now hundreds of girls at work on the farms. It is hoped that women will not be driven into the fields by such circumstances, but that more of them will be led to realize that an existence spent in healthy, honest, out-of-door work, is an existence which will enable soul and body to expand, as well as the mind. Let me urge the women of this Farmers' Club to engage in more out-of-door work, and bask in Heaven's sunlight; fewer headaches would be heard of and nervous prostration would be unknown. Have a flower or vegetable garden-take care of it all yourself, don't neglect it.

It is not my aim or purpose to discourage, or cause any of the thousands of women in this country, who are engaged in other vocations to be dissatisfied with their lot, but it is to show those, who are endeavoring to solve the question of self-support, that out-of-door occupations for women can be made profitable, provided they be carried on with steady personal application, without which, there is success in nothing.

As might be expected, Vermont's best woman farmer turned her attention to dairying, and has reached very near the top-notch in dairy fame. Mrs. Carrie J. Nelson, of Ryegate, Vermont, was left a widow, with $1,000.00 in money and as much more in a mortgaged farm. There were four children under eight years of age. In reviewing her work she says, "I did not have the courage at that time to put the $1,000.00 into the farm, and try and get a living from it, for fear that I might lose it, so I sold it to my brother-in-law, who lived in Boston, with the understanding that I should manage all his business here and that he should board my family. At the end of five years I bought back the farm, thinking that if I could manage for him, I certainly could for myself. I have always enjoyed my dairy work, striving to stand at the head, or as near to it as possible in the quality of my butter. Mrs. Nelson has taken the first prize in contests of the Vermont Dairyman's Association, Vermont Butter-makers Association, Boston Food Fair, Vermont and New Hampshire's interstate fairs, and the sweepstakes at the Vermont State Fair. She always hires the best help to be found at whatever the cost, then she keeps the same help as long as possible. Hundreds of women are earning pin money with poultry, early vegetables, fruits, jellies, pickles, etc.

## A Field for Women.

An expert marketer is the latest product of the specialization of industry. She markets, it is said, for fifty families in a suburban town, charging each $3.00 per week for her services, and saving more than that in their bills. In suburban towns prices are always higher than in the city, and the choice is not so great. Marketing consumes a great deal of time. If left to servants they buy where they get the largest commission, and long accounts are a source of profit to them. This young woman haunts not only the ordinary markets, but those of city wholesalers, and she deals with farmers direct. She stands by while each order is filled, examines the contents of every parcel, and the price list and sees that it is properly tagged. No millionaire or hotel-keeper gets the attention that she does, from tradespeople. She relieves fifty women from responsibility, and makes $150.00 a week. Women who have large country places are becoming more and more interested in fruit and flower growing, and Mrs. Oliver Hoyt of Stamford, Conn., has taken all the prizes in grapes, and Mrs. Trevor, who has a place at Yonkers, has made fine entries. Miss Delia Marble, the daughter of the late Manton Marble, is about to set out extension orchids on her place near Bedford in Westchester county, the pupils of Briar-Cliff Manor taking charge of the work for her. She will have a cold storage plant in connection with her orchids.

We hear and read a great deal about over-production and under-consumption. There is no such thing today as over-production in the New England states. A first class No. 1 article always sells. I thought a few years ago when I first launched out in the market gardening business, that there might be such a thing, but I doubled my business and did all the better. There was a time when we thought we could not raise lettuce for less than a dollar per dozen, now I should be very glad to get fifty cents. There was a time when we could not grow it (or thought we could not) in hot-houses, but were obliged to grow it in hot beds outside.

This has all been done away with. Study your business, understand the land that you cultivate, get all the information you can in relation to the business that you are carrying on, and make a specialty of some few articles, because any one of the articles that you might produce, will give you a living.

We of to-day have a better chance than they did ten or twenty years ago, even in farming. We have opportunities to-day for acquiring knowledge at the agricultural colleges and experimental stations, we have the land which is at our disposal, we have the markets, which you all know are the best in the world. There is no such market in this county, or in any other county, as the Boston market, and there are no such vegetables or produce of any kind, in such good shape as shown in the Boston markets. When I am in a large city I make it a practice to go down to the markets, and learn what I can about the handling and sale of farm produce. I was in New York in the midst of asparagus season. There was a great quantity of it coming into market; most of it came in boxes of white pine, but they were old, they had come and gone back and forth time and time again. It was very nice fine asparagus, tied up in the usual way, but it sold at that time for six cents a pound. There was another lot that came in on the same boat, in white clean boxes, made of very thin wood, cheaper boxes than the others, and the asparagus was of the same quality to all appearances, but it was tied up with nice pink tape, which does not cost five cents a mile. It looked very attractive, and it sold for ten cents a pound.

I have seen Kalamazoo celery sold in the market (and they grow very nice celery out there) tied up with blue tape, a third of an inch wide, tied at the bottom and also about half way up to the top. This blue tape on the white celery made the bunches look very attractive, and everybody wanted it. I think it is a good plan occasionally to visit the markets, study the prices, compare varieties, and learn how to better your crops and pack for market. You are really working as hard as if you were in the fields. Not long since an electric car, on the West End Road in Boston, came to a sudden stop. The motorman looked at the conductor, and the conductor looked back at the motorman, they looked up at the trolley wire, and found that all right, they took up the trap and found the fuse right. Very soon an operator came along and found the trouble. "Why, Billy," said he, "there is a dead rail and all the dynamos on the West End road would not start this car nor any car we own." Now we have all got to get over that dead rail, wake up, do something, and do it well.

There is a great deal said and written about abandoned farms; the farms are not to blame, it is the people who run them. I have travelled through the eastern and middle states thoroughly, and have yet to find the land that would not produce something. I believe that all land can and should be made productive and have no faith in the necessity of abandoned farms, when there is a willingness to work. Where my gardens are today once was rocky land covered with huckleberry bushes, now a mowing machine can run over any part of it, and the result has been accomplished by nothing more than energy and perseverance. It is perseverance that has rewarded every woman in this commonwealth with what measure of success she has attained. It was perseverance that carried the hero of Appomattox to victory. It is perseverance that carries ten per cent. of those who are successful in business life in triumph over the ninety per cent. who go down. Many and many a person has failed on the very threshhold of success for the lack of it.

I am not here to day to speak for organization, but I should be false to every consideration, false to my obligations, if I failed to call attention to the grand work, which the patrons of husbandry are doing in this state and every one of the United States, and in the assistance it has been to farmers in helping solve this great problem. Wherever the grange has established its home, and lifted its halls, as it has all over the state, it has not only offered the opportunity, but by the faithful labors of the patrons, it is securing substantial results. We have our horticultural societies, our market gardeners association, farmers clubs and other organizations. But I tell you farmers of Union grange that to-day more can be gained in the search for success in horticulture or agriculture, through the door of the earnest working grange, backed as it is by the boards of agriculture, than by any other organization in existence What wonderful progress has been made in these latter years in agriculture, in horticulture, in floriculture, in literature, in science, in art, especially in medical science (which goes to prolong human life). What comforts and luxuries are enjoyed to-day by the humblest people, that were unknown to the wealthy a few decades ago. Upon a recent visit to Washington, in going from my hotel to the capitol, I passed by the statue of Benjamin Franklin, on Pennsylvania Avenue. I looked up in the face of what seemed to be a kindly benevolent old man, and said to myself, could the stone heart beat, could the marble lips move, could the tongue speak, what would he say to his countrymen now? What would he say to this capitol city of the nation? What would he say to the electric light, the telephone? What would he say to the electric cars, the phonograph, the Atlantic cable, the flying Colonial express, which runs from Washington to Boston in twelve hours? (It took two weeks for news of the Declaration of Independence to reach Boston from Philadelphia by the swiftest transportation then known.) What would he say to the army of employees in the United States post office department? (He was George Washington's postmaster general and a member of his cabinet and he kept all the accounts of the department himself, and did not have a clerk.) What would he say if he could see plants growing by electricity in the night? What would he say to the improvement in printing, which was his profession, to the sun pictures or photographs now printed by the million in the cheapest papers? Think of the cheapness of literature, of the public libraries, and educational facilities that are within the reach of the poorest and humblest of our people. But these privileges bring with them added responsibilities for the way in which we use these blessings.

If I can get a good living and something more in sterile New England, and the soil of my farm is no better than that of thousands of others in Massachusetts, is it not an inducement and encouragement for those who live in the more fertile soil from the Potomac to the Rio Grande, and from the Golden Gate to the Hudson, to engage in this same honorable occupation?

On the morning of a memorable battle, Napoleon Bonaparte pointed his gleaming sword toward the morning sun, and said to the officers that stood about him, "Behold! Behold! the sun of victory." May the same sun of victory shine on all connected with Union Grange and upon all engaged in horticulture and agriculture, and may they be characterized far and wide, for their harmony, contentment and prosperity.

BULLETIN OF RHODE ISLAND STATE COLLEGE
VOL. VI. NO. 4. FOR FEBRUARY, 1911.

# REPORT OF THE BOARD OF MANAGERS

## PART I.

[PART II WILL BE THE USUAL REPORT OF THE EXPERIMENT STATION, WHILE PART III WILL BE THE FORTHCOMING CATALOGUE.]

KINGSTON, R. I.

1911.

PUBLISHED QUARTERLY BY THE COLLEGE
MAY, AUGUST, NOVEMBER, FEBRUARY.

ENTERED AT KINGSTON, RHODE ISLAND, AS SECOND-CLASS MATTER.

# RHODE ISLAND STATE COLLEGE.

## Corporation.

| | |
|---|---|
| Hon. ROBERT S. BURLINGAME | Newport County. |
| Hon. CHARLES DEAN KIMBALL | Providence County. |
| Hon. THOMAS G. MATHEWSON | Kent County. |
| Hon. J. V. B. WATSON | Washington County. |
| Hon. CHARLES ESTES | Bristol County. |
| Hon. WALTER E. RANGER | Commissioner of Public Schools, *ex-officio.* |
| Hon. PHILIP A. MONEY | Member, Board of Agriculture. |

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| Hon. CHARLES DEAN KIMBALL, President | P. O., Providence. |
| Hon. ROBERT S. BURLINGAME, Clerk and Treasurer | P. O., Newport. |

# REPORT.

*To His Excellency Aram J. Pothier, Governor, and the Honorable General Assembly of the State of Rhode Island and Providence Plantations, at its January Session,* 1911:

I have the honor to submit herewith the Twenty-Third Annual Report of the Board of Managers of Rhode Island State College, as required by law.

CHARLES DEAN KIMBALL,

*President, Board of Managers, Rhode Island State College.*

# REPORT OF THE PRESIDENT OF THE COLLEGE.

*To the Honorable Board of Managers of the Rhode Island State College:*

GENTLEMEN:—I have the honor to present my report for the calendar year 1910.

## Time Covered by This Report.

It is unfortunate that the report made by the college to the State authorities covers an extent of time differing by six months from that covered by the report made to the national government. The national government requires from us a report for the fiscal year from July 1 to July 1; the state government, using the calendar year, requires a report from January 1 to January 1. For instance, in August, 1910, we made a report to the national government covering the time from July 1, 1909, to July 1, 1910. *Now* we are making a report to the State government covering the time from January 1, 1910, to January 1, 1911. It will be seen that there are only six months in common between the two reports. The time in the national report from July 1, 1909, to January 1, 1910, was embraced in the State report submitted a year ago. The second six months of the national report constitute the first six months of the present report; and the second six months of the present State report will appear in the next national report. The two reports necessarily differ in nearly all figures; yet they are naturally looked upon, when considered at all, as covering the same time; and hence it is deemed strange that two reports for the same year and from the same institution should not agree closely. This disagreement has caused much confusion and has sometimes aroused unfounded suspicion.

Another unfortunate consequence of the use of the calendar year for our school report is that parts of *two* college years are included, while the whole college year is nowhere adequately treated except by repetition of parts of previous reports or by inference from given facts.

If it would not cause inconvenience to other State officials, I would recommend that hereafter our report be made to terminate with the last day of June in each year. By so doing the following advantages would be gained: (1) The report could have more careful consideration and yet be ready for presentation promptly at the opening of the legislative session; (2) the financial report for both State and national government would be identical, and cause of confusion would be entirely removed; (3) the college year as such could be considered and treated as a unit and not piecemeal in separate reports as is now the case. I can see no serious disadvantages attaching to the change. While it would not bring the situation down to the beginning of the legislative year, any particular feature of the situation needing consideration of more recent facts might be treated in detail as a supplement to the regular report.

## Attendance.

Requesting that you keep in mind the fact that my previous report considered in detail the attendance of the first half of the scholastic year 1909–10 (to February 1, 1910), I proceed, first, to summarize the attendance for the year 1909–10 as a whole, including the half-year already considered, and the remainder from February 1 to July 1, 1910; and then to treat in detail the attendance for the part of the scholastic year 1910-11 so far as elapsed, from July 1, 1910, to January 1, 1911.

*Summary of Attendance for the Scholastic Year* 1909–10.

| | |
|---|---|
| Graduate students | 6 |
| Seniors | 17 |
| Juniors | 20 |
| Sophomores | 24 |
| Freshmen | 59 |
| Irregulars | 25 |
| Total college attendance | 151 |
| Two-year short course | 29 |
| Poultry (six weeks) | 20 |
| Total (no names repeated) | 200 |

In my previous report I pointed out that the fall term enrollment for the year 1909–10, notwithstanding the dropping of the Sub-Freshman or high-school classes and the increase of the entrance requirements by two units, exceeded the enrollment of the previous year. A comparison of the two years as units shows that the college attendance of 1909–10 exceeds that of 1908–09 by 24 per cent., and the total enrollment of the later year is greater than that of the former by 9 per cent.

## Summary of the Attendance for the Fall Term of the Scholastic Year 1910-1911.

At the opening of the fall term in September, we had as a cause affecting the registration not only the previous addition of two and one-half units to the entrance requirements of 1908, but also the further increment of two units scheduled for 1910-11. This addition, while it has undoubtedly seriously affected the college enrollment, has not prevailed so far as to decrease it. Indeed there has been a slight increase both in the college attendance (3 per cent.) and in the total, not reckoning summer students. For ready comparison I place the figures of the two previous years side by side with those of the current year.

| | Year 1908–09. | Year 1909–10. | Year 1910–11 |
|---|---|---|---|
| Graduates | 5 | 6 | 3 |
| Seniors | 13 | 17 | 19 |
| Juniors | 20 | 20 | 20 |
| Sophomores | 32 | 24 | 35 |
| Freshmen | 38 | 59 | 62 |
| Irregulars | 14 | 25 | 17 |
| Total, college students | 122 | 151 | 156 |
| Sub-Freshmen | 28 | 0 | 0 |
| Two-year practical course | 20 | 29 | 23 |
| Special poultry course | 19 | 20 | 28 |
| Summer school | 0 | 0 | 39 |
| Total | 189 | 200 | 246 |
| Deduct names repeated | 6 | 0 | 0 |
| Final total | 183 | 200 | 246 |

In the registration of the two-year practical courses a decrease will be noticed. This is caused by an action taken by the faculty and announced in the catalogue of 1910, raising the age limit for the two-year courses to eighteen years. It was felt that a lower age limit was unsatisfactory, for at least two reasons. One is that students below eighteen years of age are, as a rule, too immature to handle successfully the work of courses designed for men and women who, while lacking in opportunity for preparation, have had some experience in life and are especially earnest in application and matured in power. The second is that the courses seemed to offer a temptation to young people not driven by necessity to leave the high school before completion of the course there, and take what they assumed to be a short cut to practical life. These courses were designed, as stated in the catalogue, to enable those who have had some experience with life to remedy, in a measure, deficiencies of previous training and to fit themselves more directly for the occupations they have in view or have already entered upon.

The Freshman class of the current year, while showing in number not a large increase over that of one year ago, is more uniform in quality of preparation. These matters will appear more clearly as the subsequent tables are studied.

## Table I.

In order to keep clearly in view the progress in college attendance, we have in previous years presented a table showing fall-term enrollment from the year 1902 on. As this has now become somewhat cumbersome, owing to the number of years included, I have shortened the table by taking the first, the middle and the last year of the series for which we have figures.

## TABLE I.

*Showing comparative statistics from* 1902—1910-11

| GRADE OF STUDENTS. | Fall, 1902. | Fall, 1906. | Per cent. of Increase in First Four Years. | Fall, 1910. | Per cent. of Increase in Second Four Years. | Per cent. of Increase in Eight Years. |
|---|---|---|---|---|---|---|
| College | 39 | 61 | 56 | 156 | 154 | 297 |
| Sub-Freshman, High-School | 39 | 40 | 2½ | 0 | ...... | ...... |
| Practical two-year courses, non-collegiate | 7 | 4 | *45 | 23 | 450 | 214 |
| Poultry course | 27 | 20 | *42 | 28 | 35 | 3$\frac{7}{10}$ |
| Summer school | 0 | 0 | ...... | 39 | ...... | ...... |
| Total | 112 | 125 | 11½ | 246 | 95 | 118 |
| Freshman class | 13 | 17 | 31 | 62 | 259 | 369 |
| Graduating class | 6 | 8 | 33 | 16 | 100 | 166 |
| Teaching faculty | 23 | 24 | 4 | 28 | 16$\frac{4}{5}$ | 21 |

From this table it will be noted that, in the last four years,

1. The freshman class has increased in number over three and one-half times.

2. The graduating class has doubled.

3. The college attendance has increased more than two and one-half times.

4. The total attendance has nearly doubled.

5. The number of the teaching faculty has been increased by only three, or 12½ per cent. (Of the four in the table, one is the military officer appointed and paid for by the United States War Department.)

During the same years,

1. The preparatory school has been abolished.

2. The entrance requirements have been enlarged four and one-half units, or 53 per cent.

3. The summer school for teachers has been added; the exten-

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* Decrease.

sion work has been greatly increased, and the farmers' week has been successfully carried on for two years. (Of the numbers reached by these last two means no reckoning has been made in the foregoing table.)

4. The highest salary paid to a professor has been increased 38 per cent; and the total salary list has been increased 40 per cent.

5. The women's department has been added.

6. The teaching faculty has been greatly strengthened by new blood, twenty out of twenty-seven having been appointed during the four years under consideration.

7. The inventory value of all property held by the college has increased 36 per cent.

8. The annual maintenance appropriation from the State has remained stationary, while the income from other sources has increased 70 per cent.

TABLE II.

*Showing attendance by class and sex during the college year* 1910–11, *up to February* 1, 1911.

| CLASS. | Men. | Women. | Total. |
|---|---|---|---|
| Graduates | 2 | 1 | 3 |
| Seniors | 15 | 4 | 19 |
| Juniors | 16 | 4 | 20 |
| Sophomores | 29 | 6 | 35 |
| Freshmen | 55 | 7 | 62 |
| Irregulars and specials | 14 | 3 | 17 |
| Total, of college grade | 131 | 25 | 156 |
| Two-year practical courses | 19 | 4 | 23 |
| Summer school (four weeks) | 5 | 34 | 39 |
| Poultry course (six weeks) | 24 | 4 | 28 |
| Final total | 179 | 67 | 246 |

The object of Table II is to show the number and distribution of men and women at the college. It will be seen that the number of women in the college classes is twenty-five, with four attending the two-year practical work. By comparing this table with Table V, it will be found that of the twenty-five sixteen are in the home economics course, and of the four short-course students three are in the domestic science work. The remaining ten are distributed as follows: one is in the civil engineering course; two college women and the remaining short-course woman are in the agricultural course; and six are in the applied science course.

TABLE III.

*Showing number and distribution of matriculates in the current year as compared with number in attendance and matriculating in previous years.*

| | Previous Matriculates. | Matriculates of 1910–11. | Total. |
|---|---|---|---|
| Graduates | 3 | ........ | 3 |
| Seniors | 19 | ........ | 19 |
| Juniors | 19 | 1 | 20 |
| Sophomores | 33 | 2 | 35 |
| Freshmen | 13 | 49 | 62 |
| Irregulars | 13 | 4 | 17 |
| Total | 100 | 56 | 156 |
| Two-year practical course | 8 | 15 | 23 |
| Summer school | ........ | 39 | 39 |
| Poultry course | ........ | 28 | 28 |
| Final totals | 108 | 138 | 246 |

Table III gives information concerning the persistency of the students in attendance from year to year. It is not expected, of course, that the poultry students return from year to year. As the summer school was begun only last year, all are necessarily new matriculates. Naturally, the two-year practical course shows the largest change of personnel, only eight returning out of an enrollment last year of twenty-eight. The two-year course is still an experiment, and the faculty have given much attention to it. Of the regular college students the total loss, not reckoning the Senior class, has been twenty-seven, divided as follows: of the six graduate students, one received the M. S. degree, one, having completed the work he had undertaken to do has withdrawn, one has been called to a position in Mississippi, and three are continuing their work. The Junior class of last year returned with the exception of three; the Sophomore class lost six; and the Freshman class, fifteen; a total of twenty-seven, or approximately 25 per cent. A consideration of the cause of loss in each individual case seems to give the following results:

| | |
|---|---|
| Business | 8 |
| Falling behind in course | 7 |
| Illness | 1 |
| Home necessities | 6 |
| Discipline | 2 |
| Unknown | 2 |
| To go elsewhere | 1 |

The Senior class lost during the four years from the time of entrance eight members, or 31 per cent. This is not excessive as compared with other institutions. It must be remembered, in considering this matter, that the character of the work in the various classes has been bettered, and the demand upon the student's preparation and mental ability has been very greatly increased during the four years under consideration.

TABLE IV.

*Showing average age October* 1, 1910. (*Summer school students omitted.*)

| CLASS. | Men. | Women. | Both. |
|---|---|---|---|
| Freshman class | 19 yrs., 3 mos. | 19 yrs., 7 mos. | 19 yrs., 3¾ mos. |
| Senior class | 22 yrs., 8 mos. | 20 yrs., 9 mos. | 22 yrs., 4 mos. |
| Short course, entering class. | 19 yrs., 5 mos. | 18 yrs., 2 mos. | 19 yrs., 3 mos. |
| Poultry class | | | Over 30 years. |

This table requires no especial comment. It shows that our students are of the usual college age, eighteen or nineteen for Freshmen to twenty-two or twenty-three for graduates.

TABLE V.

*Showing registration in courses.*

| CLASS. | Agriculture. | ENGINEERING. | | | | | Applied Science. | Home Economics. | Total. |
|---|---|---|---|---|---|---|---|---|---|
| | | Mechanical. | Civil. | Electrical. | Chemical. | Total. | | | |
| Graduates | 1 | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 3 |
| Seniors | 6 | 2 | 4 | 1 | 1 | 8 | 5 | ..... | 19 |
| Juniors | 1 | 2 | 3 | 8 | ..... | 13 | 3 | 3 | 20 |
| Sophomores | 7 | 5 | 5 | 10 | ..... | 20 | 3 | 5 | 35 |
| Freshmen | 7 | ..... | ..... | ..... | ..... | 39 | 10 | 6 | 62 |
| Irregular and special | 5 | 3 | 2 | ..... | 2 | 7 | 3 | 2 | 17 |
| Total, college | 27 | 12 | 14 | 19 | 3 | 87 | 26 | 16 | 156 |
| Short course | 12 | 7 | ..... | ..... | ..... | 8 | ..... | 3 | 23 |
| Poultry course | 28 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 28 |
| Summer school | 13 | ..... | ..... | ..... | ..... | ..... | 12 | 14 | 39 |
| Final total | 80 | 19 | 14 | 19 | 3 | 95 | 38 | 33 | 246 |

I regret to say that this table shows a decrease of one in the number of students taking the long course in agriculture. In view, however, of the fact that the ratio between farm population for this State and the number of agricultural students continues so large, and that the increase of agricultural students must come from the cities, it is perhaps not surprising that the number should vary from time to time. Then, too, we are now requiring for agricultural students the same number of entrance units as for other students—an amount of entrance work much larger than the average agricultural college requires. This has undoubtedly cut down the number in that course. The same is true of the engineering courses. The work has been greatly stiffened and the entrance requirements increased. On the other hand, we have found the course in applied science for teachers unexpectedly popular, and the home economics course shows a healthy increase.

## Table VI.

*Showing local and non-local attendance.*

| Class. | Village Residents. | Transported Daily by Trains and Bus. | Boarding in |  |  | Total. |
|---|---|---|---|---|---|---|
|  |  |  | Village. | Dormitories. | Both. |  |
| Graduates | 1 | ..... | 2 | ..... | 2 | 3 |
| Seniors | 1 | 3 | ..... | 15 | 15 | 19 |
| Juniors | ..... | 3 | 1 | 16 | 17 | 20 |
| Sophomores | ..... | 3 | 1 | 31 | 32 | 35 |
| Freshmen | 2 | 7 | 4 | 49 | 53 | 62 |
| Irregular | ..... | 2 | 2 | 13 | 15 | 17 |
| Total, college | 4 | 18 | 10 | 124 | 134 | 156 |
| Two-year course | ..... | 3 | 4 | 16 | 20 | 23 |
| Summer school | 2 | 1 | ..... | 36 | 36 | 39 |
| Poultry course | ..... | 2 | 3 | 23 | 26 | 28 |
| Final total | 6 | 24 | 17 | 199 | 216 | 246 |

This table is intended to show in how far the college is making use of the dormitory accommodations provided and to what degree the attendance is local. It is to the credit of an institution if it is so far locally attended as to show due appreciation on the part of those who have the best opportunity of knowing its work. At the same time, a State institution should serve all the State. It will be seen that there are four students within walking distance—all enrolled in the college classes. Twenty-three live near enough to go back and forth daily by train, even as far as Providence, and are transported to and from the station free of charge by the college buses. Exclusive of the summer students, 163 live in the dormitories, while seventeen are rooming in the village; a total number of 180 resident boarders.

## TABLE VII.

*Showing attendance from other States, and from counties of Rhode Island.*

| CLASS. | Resident in Other States. | RESIDENT IN RHODE ISLAND BY COUNTIES. | | | | | TOTAL IN R. I. | | Total. |
|---|---|---|---|---|---|---|---|---|---|
| | | Bristol. | Kent. | Newport. | Providence. | Washington. | Number. | Per cent. | |
| Graduates | .... | .... | .... | .... | .... | 3 | 3 | 100 | 3 |
| Seniors | 4 | .... | .... | 1 | 9 | 5 | 15 | 79 | 19 |
| Juniors | 4 | .... | 3 | .... | 6 | 7 | 16 | 80 | 20 |
| Sophomores | 11 | .... | 3 | 1 | 15 | 5 | 24 | 68 | 35 |
| Freshmen | 16 | 1 | 2 | 3 | 23 | 17 | 46 | 74 | 62 |
| Irregulars | 5 | .... | .... | 3 | 7 | 2 | 12 | 71 | 17 |
| Total, college | 40 | 1 | 8 | 8 | 60 | 39 | 116 | 74 | 156 |
| Short courses | 4 | 1 | 1 | 3 | 10 | 4 | 19 | 82 | 23 |
| Poultry course, | 19 | .... | 1 | 1 | 7 | .... | 9 | 32 | 28 |
| Summer school | 1 | .... | 3 | 1 | 15 | 19 | 38 | 97½ | 39 |
| Final total | 64 | 2 | 13 | 13 | 92 | 62 | 182 | 74 | 246 |

This table should be considered in connection with the next table which is, indeed, simply an elaboration of Table VII.

## TABLE VIII.

*Showing home residence of students by States and by townships of Rhode Island.*

A. College and short-course students:

| | Number. | Per cent. of Whole No.—179. |
|---|---|---|
| Cuba | 1 | .6 of 1 |
| Connecticut | 6 | 3.5 |
| Massachusetts | 22 | 12 |
| New York | 10 | 5.7 |
| New Jersey | 1 | .6 of 1 |
| Panama | 1 | .6 of 1 |
| Pennsylvania | 1 | .6 of 1 |
| Virginia | 2 | 1.1 |
| Total non-resident in the State | 44 | 24.9 |

### TABLE VIII.—*Continued.*

| | Number. | Per cent. of Whole No.—179. |
|---|---|---|
| Bristol | 2 | 1.1 |
| Bristol County, total | 2 | 1.1 |
| East Greenwich | 5 | 2.8 |
| Warwick | 5 | 2.8 |
| Kent County, total | 10 | 5.6 |
| Jamestown | 2 | 1.1 |
| Middletown | 2 | 1.1 |
| Newport | 5 | 2.2 |
| New Shoreham | 1 | .6 |
| Newport County, total | 10 | 5.0 |
| Burrillville | 2 | 1.1 |
| Central Falls | 5 | 2.8 |
| Cranston | 6 | 3.5 |
| Cumberland | 8 | 4.5 |
| Johnston | 1 | .6 |
| Lincoln | 1 | .6 |
| North Smithfield | 1 | .6 |
| Pawtucket | 9 | 4.5 |
| Providence | 28 | 15.8 |
| Scituate | 1 | .6 |
| Smithfield | 1 | .6 |
| Woonsocket | 7 | 4.0 |
| Providence County, total | 70 | 39.0 |
| Charlestown | 1 | .6 |
| Hopkinton | 3 | 1.7 |
| Narragansett | 3 | 1.7 |
| North Kingstown | 6 | 3.5 |
| Richmond | 2 | 1.1 |
| South Kingstown: Village of Kingston | 7 | 4.0 |
| Remainder of South Kingstown | 8 | 4.5 |
| Westerly | 13 | 7.3 |
| Washington County, total | 43 | 24.3 |
| Rhode Island, total | 135 | 75.4 |

| | Number. | Per cent. of Whole No.—67. |
|---|---|---|
| B. Poultry-course and summer-school students: | | |
| Georgia | 1 | 1.5 |
| Massachusetts | 11 | 16.4 |
| New Hampshire | 2 | 3.0 |
| New Jersey | 1 | 1.5 |
| New York | 3 | 4.5 |
| Pennsylvania | 1 | 1.5 |
| Vermont | 1 | 1.5 |
| Total, non-resident in the state | 20 | 30.0 |
| Crompton | 1 | 1.5 |
| Warwick | 1 | 1.5 |
| East Greenwich | 1 | 1.5 |
| West Greenwich | 1 | 1.5 |
| Kent County, total | 4 | 6.0 |
| Newport | 2 | 3.0 |
| Newport County, total | 2 | 3.0 |
| Lincoln | 1 | 1.5 |
| Providence | 18 | 27.0 |
| Pawtucket | 1 | 1.5 |
| Burrillville | 1 | 1.5 |
| Cranston | 1 | 1.5 |
| Providence County, total | 22 | 32.8 |
| Hopkinton | 1 | 1.5 |
| North Kingstown | 1 | 1.5 |
| South Kingstown | 11 | 16.4 |
| Westerly | 6 | 10.5 |
| Washington County, total | 19 | 28.4 |
| Rhode Island, total | 47 | 70.0 |

The main fact that I would call attention to in these tables is the percentage of college students from within the State. Two years ago, only 68 per cent. of our students were from Rhode Island; one year ago, the percentage was 71. The present year shows an increase to 74 per cent. These percentages would seem to indicate a growth of respect for the college and confidence in it that is encouraging.

It is undoubtedly a fact that the college has enjoyed greater esteem and public confidence in eastern Massachusetts than in some parts of Rhode Island itself. This peculiar condition is explainable only by considering the following facts: (1) The college arose out of a conflict of interests which left behind it ill-will and bitterness: (2) It was half-heartedly supported from the beginning, its main dependence being the funds from the United States government—funds strictly limited in their application; (3) The fundamental ideas on which its work is based, while now generally recognized and accepted, were until quite recently intolerable to a large part of the educators of the State; (4) Its existence was regarded as inimical to educational interests long established, deeply revered and loyally upheld by the leading people of the State; (5) It was situated in a corner of the State, some distance from the centers of population, therefore was unknown and, where known, regarded as alien to the interests of the larger portion of the public; (6) Public support of higher education from public funds was foreign to the traditions of the people. All this provoked constant attack within the State, and these attacks aroused and maintained suspicion and distrust on the part of those who would otherwise have gladly availed themselves of the opportunities it offered.

On the other hand, those without the State heard little of these attacks, and knew only the results of good work in the form of students returning visibly strengthened and well equipped for service in the Commonwealth. These were the advocates and advertisers of the college, and thus, outside the State, its reputation and its prestige have grown without opposition.

Considering all these facts, we are warranted in congratulating the college and the people of the State on the advancing percentage previously noted.

## Causes for Confidence.

A survey of the preceding tables should, it would seem, inspire a great degree of confidence and pride on the part of all loyal Rhode Islanders. They show marked progress and improvement in every phase of college life considered. Other causes for such confidence are not far to seek. (1) The careful, systematic, thorough and impartial report of the Commission of Inquiry appointed by the General Assembly of 1908 removed all basis for the constant attack previously mentioned as retarding growth inside the State. This report authoritatively assured the people of the State (a) that the finances of the college are and have been wisely and economically administered; (b) that its educational methods and principles are sound; (c) that no other educational agency in the State "is doing or can do the work of the Rhode Island College;" (d) that it is worthy of and should receive public confidence and a more generous support, financial and moral, from the people of the State; (e) that proposed changes, such as elimination of the courses in engineering, reduction to the grade of a technical high school, and removal of the engineering work to an industrial center would be either contrary to national law or uneconomical and therefore inexpedient; (f) that the growth of the college in numbers and influence is genuine, relatively rapid, and highly promising for the future.

(2) A second cause for confidence may be found in the report of the Board of Visitors for the year 1910, just made to your Board of Managers and published as an appendix to the present report. This Board was appointed by your Board one year ago, in accordance with a recommendation of the commission, and consisted of Dr. Arthur J. Jones, of the State Normal School, Providence; Hon. Isaac L. Sherman, of Newport; Hon. Arnold B. Chace, Chancellor of Brown University, Providence; Hon. Lewis A. Waterman, of Providence; Mrs. Charles Warren Lippitt, of Providence; and Mrs. Frank E. Marchant, of South Kingstown.

This report, while evidencing its sincerity by frequent criticism of details, concludes with the following sentences:

> "On the whole, we feel that, while the buildings and equipment are inadequate in many ways, while there are pressing needs, the college is doing work of which the State may well be proud. . . . . The standard of work done compares favorably with that of other New England colleges. The college is, in an ever-increasing degree, meeting the needs of the State and fulfilling the purpose of its founding."

If there is any value in human testimony, such words over the signatures of people of the highest standing in the State should carry conviction, and men should feel debarred from entertaining and expressing opposing notions, necessarily the product of lack of information and investigation. The reputation of a college is as sensitive to open attack or to the

"silent smiles of slow disparagement,"

as is the good name of a woman. Many men do not stop to investigate a school when some one perhaps idly speaks against it. Simpler is it to eliminate that school from consideration, and to choose among others of which he hears good things. Especially unfortunate, therefore, is disparagement of a good State institution. It injures the individual by preventing him from enjoying advantages that lie within his reach. It also injures the State by preventing it from realizing for its outlay the full return of value in an educated constituency which would otherwise accrue.

It is pleasant to realize that this view is becoming more and more general. In the year 1903, the entire college attendance from Rhode Island was only thirty-eight. Twenty-seven, or three-fourths, of these came from Washington county. Only six came from the whole of Providence county. In the year 1911, the attendance from Providence county, reckoning only students coming in under the thirteen-unit entrance requirement, has been multiplied by ten, that from Newport by three and a half, and that from Kent by four. The attendance from Washington county has meanwhile increased 40 per cent., but instead of being three-fourths of the whole attendance from Rhode Island, it is now only one-third. Nor has this been brought about by drawing from the attendance at other institutions. An examination of the catalogues of Brown University for 1903 and 1911, will show an increase of undergraduate attendance at that institution from every county in the State. It seems to be quite evident from this that the existence of this college has created a clear gain of 28 per cent. in the attendance of students of college grade within the State. More specifically, there are now one hundred and fifteen more Rhode Island men and women attending college within the limits of the State than there would be without this college.

## Entering Class.

The requirements of the year 1910–11 for entrance to the college courses were thirteen units on the Carnegie Foundation scale.

The status of the entering students as to conditions was as follows:

| | |
|---|---|
| Entering without conditions | 47 |
| Entering with one condition or less | 9 |
| Entering with one and one-half conditions | 3 |
| Entering with two conditions | 3 |
| Entering with two and one-half conditions | 2 |

| | |
|---|---|
| Entering with three conditions | 1 |
| Entering with three and one-half conditions | 1 |
| Entering with four conditions | 4 |
| | 70 |

The classification was as follows:

| | |
|---|---|
| Junior (two years of college work in addition to entrance requirements) | 1 |
| Sophomore (one year of college work as above) | 1 |
| Freshman | 61 |
| Freshman (Special, more than two deficiencies) | 7 |
| | 70 |

## Finances.

In the report of the treasurer appended will be found two financial statements, one according to our usual custom in account with the various funds and covering the calendar year 1910; the other covering the scholastic year from July 1, 1909, to June 30, 1910, and presenting the financial transactions of that scholastic year in accordance with certain standard forms devised by the Carnegie Foundation for the Advancement of Teaching, for the purpose of making uniform, so far as practicable, the annual financial reports of universities, colleges, etc., throughout the country. In order that there may be no confusion created by the two sets of accounts which, it cannot be too often repeated, cover years differing from each other by six months, the second is put in as an appendix to the full report.

As neither of these summarizes the figures for the calendar year in one group, I give a table showing receipts from all sources and expenditures during the calendar year. The table, in both receipts and expenditures, distinguishes three accounts: (a) the maintenance, instructional, and extension finances; (b) the boarding and bookstore accounts (called in the table the trust fund); and (c) the funds of the experiment-station department. Reference is made where necessary to the treasurer's report in account with the fund in question. This table leaves entirely out of consideration the special appropriation for athletic field and the transactions connected with the fertilizer and feeding-stuff inspection.

## CURRENT RECEIPTS AND EXPENDITURES OF RHODE ISLAND STATE COLLEGE, FOR THE CALENDAR YEAR, 1910.

### RECEIPTS.

*Maintenance, instruction, and extension.*

| | | | |
|---|---|---|---|
| Jan. 1. | Apportionment of 1890 Morrill Fund for the year 1909–1910 | | $20,000 00 |
| | This payment amounted to $40,000, and was made in advance July 1, 1909. It was apportioned, one-half to the six months from July 1 to December 31, 1909; the other half as above, to the six months from January 1 to June 30, 1910. (See treasurer's report, Morrill Fund of 1890. It will be noted that there is an unexpended balance of $1,875.08 from the apportionment of the previous six months included with the $20,000 in the "Balance on hand.") | | |
| July 1. | Apportionment of 1890 Morrill Fund for the year 1910–1911 | | 22,500 00 |
| | This payment amounted to $45,000, and was made in advance July 1, 1910. It was apportioned, one-half to the six months from July 1 to December 31, 1910, as above, and the other half to the six months from January 1 to June 30, 1911. This amount is still on hand. (See treasurer's report, re. 1890, Morrill Fund; item, cash payment from United States.) | | |
| Jan. 1. | Payment, account, 1862 Morrill Fund | | 2,500 00 |
| Jan. 1. | State maintenance | | 25,000 00 |
| May 1. | State appropriation for repairs | | 4,000 00 |
| May 1. | State appropriation for extension | | 1,000 00 |
| Dec. 31. | Receipts, Current Fund (See treasurer's report, this fund) | | |
| | Dormitory fees | $3,687 15 | |
| | Department fees | 1,814 38 | |
| | Tuition | 880 97 | |
| | Department sales | 5,675 64 | |
| | Department service | 905 53 | 12,963 67 |
| (a) | Total receipts for maintenance, instruction and extension | | 87,963 67 |
| Dec. 31. | Trust Fund (See treasurer's report—this fund.) | | |
| | Boarding receipts | $19,723 46 | |
| | Store receipts | 3,364 23 | |
| | Interest | 1,002 35 | |
| (b) | Total receipts, Trust Fund | | 24,090 04 |
| Dec. 31. | Hatch Fund, received from U. S. Treasurer in quarterly payments | $15,000 00 | |
| Dec. 31. | Adams Fund, received from U. S. Treasurer— | | |
| | January 1 | $3,250 00 | |
| | April 1 | 3,250 00 | |
| | July 1 | 3,750 00 | |
| | October 1 | 3,750 00 | |
| | | $14,000 00 | |

| | | | |
|---|---|---|---|
| Dec. 31. | Miscellaneous Experiment-Station Fund. (See treasurer's report.) | | |
| | Department receipts | $1,856 37 | |
| | Interest | 127 03 | |
| | | $1,983 40 | |
| (c) | Total receipts, Experiment Station | | 30,983 40 |
| | Final total, all current receipts of college | | $143,037 11 |

### EXPENDITURES.

| | | | |
|---|---|---|---|
| Dec. 31. | Salaries—maintenance, instruction and extension | | $42,983 92 |
| | Maintenance, other expenditures | | 25,914 64 |
| | Instruction and extension, other expenditures | | 17,521 73 |
| (a) | Total, maintenance, instruction and extension | | $86,420 29 |
| | Trust Fund—Boarding | $18,522 13 | |
| | Store | 3,417 43 | |
| (b) | Total expenditures, Trust Fund | | 21,939 56 |
| | Salaries—experiment station | $18,758 28 | |
| | Land, rent, and buildings, experiment station | 2,833 64 | |
| | Other expenditures | 13,046 94 | |
| (c) | Total expenditures, experiment station | | 34,638 86 |
| | Final total, all college expenditures | | $142,998 71 |

This table shows that (1) the finances of the maintenance, instruction and extension divisions of the college are in a healthy condition, receipts exceeding expenditures by $1,543.38. It is to be remembered, however, that the calendar year is not a natural unit for school operations. These naturally pause in June of each year. The expenses of the school year are considerably heavier for the six months from January to July. In this connection it may be observed that a part of the heavier expenditure in the last six months of 1910 is explained by the fact that there remained in the Morrill fund from the second six months of 1909 an unexpended balance of $1,875.08 which, according to the terms of the law must be covered by orders for apparatus, etc., placed before July 1, 1910, or revert to the United States treasury. Orders for this amount were placed and were paid for in July, August, and September. Another cause for larger expenditures was the summer school which added expense both by increasing the salary list and maintenance expense, and also by necessitating the running of the large kitchen and dining-room at a loss. Even so, however, the situation is quite satisfactory. As is seen above, we have carried over as an addition to the receipts of the next six months, completing the college year 1910–11, the unexpended $1,543.38 plus $1,875.08 not reckoned in the table as among our receipts—a total unexpended balance from the year's operations of $3,418.46.

Secondly, the table shows an excess of receipts over expenditures in the trust fund of $2,153.48—a complete and gratifying reversal of previous conditions. One year ago, the trust fund showed a deficit of $1,064.10. It should be explained that, on July 1—the time when the twenty-five cents per week increase in the rate of board went into effect as ordered by your Board more than a year ago,—the trust fund deficit amounted to a little more than $1,500.00 At that time it was ordered that $1,500 be transferred from the current fund to the trust fund. It is for this reason that the trust fund account in the treasurer's report shows a larger balance than I have given in the table. The table likewise does not take account of the deficit at the beginning of the year which is, of course, included in the treasurer's account with the fund.

In the third place, the table shows that, in the experiment-station funds, the expenditures have exceeded receipts during the year by $3,655.46. As the increasing fund from the United States government for experiment-station work arrived at its maximum with the quarterly payment of July 1, 1910, this would be a serious matter if it meant that the experiment station had undertaken work that would mean a permanent yearly excess of expenditures over receipts. The present excess, however, has no such meaning. One year ago the miscellaneous fund of the experiment station had an accumulated balance of $5,790.46. In October and November of that year, you authorized the construction of a root house, a poultry hospital, and a brooder-house, to be paid for from this surplus. The brooder-house has not been constructed; but the root house was built before the end of the year 1909 and the hospital was completed some time in August of 1910. Expenditures for these buildings appear under the heading "land and building," in the schedule of expenditures for the experiment-station funds. Extraordinary expenditures, paid for from this fund, have occurred in connection with the organization of the "Farmers' Experimental Union," which the Director undertook with the advice and consent of the Board of Managers.

The experiments so carried on have required expenditure to the amount of $1,647.04, as follows:

| | |
|---|---|
| Traveling | $530 01 |
| Salaries | 1,076 00 |
| Miscellaneous | 41 03 |
| | $1,647 04 |

The organization is now incorporated, and it is expected that it will be able to carry forward its work without large expenditure from the funds of the experiment station.

As a whole, it will be seen from the table that the total income of the college almost exactly balances the total expenditure for the year 1910, the small surplus of $38.40 being in favor of the college.

One serious difficulty in the management of our finances is our inability, on account of the unsatisfactory housing, to obtain full benefit from the expenditure of the 1890 Morrill Fund. As has been often stated, this fund can be used only for certain salaries and for apparatus in the corresponding departments. Recognizing that apparatus, though needed, cannot be satisfactorily utilized and cared for in the confined space at command, professors are disinclined to expend money for such apparatus, with the result that there remains near the end of each college year an increasing unexpended balance. Now this fund must be entirely expended or covered by outstanding orders on the first of July of each year, or the amount so unexpended reverts to the United States Government. On July 1, 1909, the amount covered by orders placed late in the year was $1,400.69. On July 1, 1910, the amount was $2,755.44. For the present college year the departments have had to procure apparatus earlier in the year, partly on account of the sectioning of classes, and the late orders will be smaller in amount.

On the other hand the demands on maintenance and current funds for work, material and teaching not payable from the Morrill Fund are increasingly insistent. To restrain expenditure in one direction and, at the same time, maintain sane, orderly, and economic development in the other is a somewhat serious problem and requires constant watchfulness and careful judgment.

## Cost of Collegiate Education.

There is current among the people much vague misconception of the cost of collegiate education and, especially, of the justice and expediency of State support of such education. This feeling frequently finds public utterance and was more or less directly involved in a recent newspaper communication to which I had occasion to reply. As the reply contains some statistics of permanent value, I insert here a part of it for future reference.

In connection with the subject of cost the following remarks may not seem out of place.

(a) There are those who feel that *any* money paid for higher education by the State is unwarranted—that the individual should pay for his own education beyond the high school. As a matter of fact, no man who receives a college education pays in dollars and cents for what it costs in dollars and cents. He pays only a part, usually a minor part, of the actual expense. Higher education is a matter so costly that to require the individual student to pay his full share of that expense would mean the exclusion of all but the exceptionally wealthy from the ranks of educated men. Realizing that such a situation would be a grave menace to the existence of organized society, men have devised two ways of meeting the danger. The one consists in raising funds by gift from philanthropically disposed persons to constitute an institutional endowment, the interest of which is used to supplement direct payments from students. Colleges and universities so provided are called endowed institutions. The other is for society itself in its organized capacity to assume the burden of establishing and maintaining State institutions of higher instruction. This it does in the discharge of the duty of self-preservation. The leader and expert is essential to the community, and it is the community that must make effort and sacrifice in order to provide him for itself. So true is this that the most highly developed countries of the world have all refused to relegate to private benevolence solely a function so important as the preparation of a body of leaders and experts; and have established State and national systems of public education extending from common school to university.

(b) The beneficiaries of State-supported public education have sometimes been stigmatized as educational mendicants. Since, as before stated, all educated men receive more than they pay for, educational mendicancy becomes, in all cases, not a question of fact but a question of degree only. To receive an educational benefaction from private benevolence masked in the form of an endowment is neither more commendable nor less discreditable than to accept the same thing as a social right, and, concurrently, as a social obligation, from organized society in the form of direct appropriations from taxation. To indicate the degree of obligation in either case, I refer to the two tables appended. It will be seen from Table I (multiplying the figures for the single year by four) that a Harvard graduate costs $1,940, of which he himself pays in tuition and fees from $700 to $900, while the university pays the remainder, from $1,240 to $1,040. In like manner, Table II, a graduate of the University of Wisconsin costs $1,404, of which he pays from $60 to $400, while the university pays from $1,344 to $1,004. If one chooses to regard the Wisconsin graduate as an educational mendicant to the extent of $1,300, must he not equally stigmatize the Harvard graduate to the extent of $1,200?

(c) Admitting the two previous points, one is left merely to inquire whether, in a given case, the cost to the State is excessive. To answer this, I have appended Table II. In considering these data, it must be remembered that these figures reckon into the per capita cost for the regular students all expense for extension work, for special winter courses, and for summer schools; also that the cost of scientific and vocational instruction is necessarily much greater than for the traditional literary course. Taking the figures just as they stand and comparing them with the figures for the great endowed institutions, we see that the State school, in every case, costs less than the lowest endowed school for which the Carnegie Foundation gives figures. Comparing the land-grant institutions in New England with each other, we find that Massachusetts comes first with a cost of $467; Connecticut second, with $423; Rhode Island third, with $391; Maine fourth, with $356; New Hampshire fifth, with $319; and Vermont sixth, with $286.

### TABLE I. ENDOWED INSTITUTIONS.

*Based on Bulletin No. 5, Carnegie Foundation, Table I.*

| NAME. | Number of Students 1907–08. | Total Expenditures All Departments. | Per Capita Expenditures. | Fees Per Capita. | Excess Paid by Institution. |
|---|---|---|---|---|---|
| Columbia University | 3,057 | $1,330,156 | $435 | $225–$325 | $215–$115 |
| Harvard University | 3,881 | 1,880,525 | 485 | 175– 225 | 310– 260 |
| Haverford College | 160 | 106,203 | 663 | 463 | 200 |
| Princeton University | 1,314 | 588,572 | 447 | 220 | 227 |
| Williams College | 487 | 213,000 | 437 | 190 | 247 |

## TABLE II. STATE INSTITUTIONS.

*Based on Bulletion No.* 6, *National Education Bureau for* 1909–10.

| NAME. | Students not included in Summer School or Winter courses. | Current Income from State. | Current Income from Nation. | Total Current Income. | PER CAPITA FIGURES. | | | | Excess Paid by Institution. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | State Expenditures. | National Expenditures. | Total Expenses. | Fees. | |
| Maine | 709 | $100,000 | $40,000 | $252,166 | $140 | $56 | $356 | $116–150 | $240–200 |
| New Hampshire | 240 | 14,590 | 40,000 | 76,501 | 61 | 167 | 319 | ........ | ........ |
| Vermont* | 498 | 16,000 | 40,000 | 142,419 | 32 | 80 | 286 | 90–95 | 196–191 |
| Connecticut | 197 | 26,950 | 40,000 | 83,398 | 137 | 203 | 423 | 60 | 363 |
| Massachusetts | 350 | 125,625 | 26,667 | 163,445 | 359 | 76 | 467 | 25–40 | 442–427 |
| Rhode Island | 180 | 25,000 | 40,000 | 70,320 | 139 | 222 | 391 | 29–69 | 362–322 |
| Mass. Inst. Technology.* | 1,462 | 29,000 | 13,333 | 517,762 | 20 | 9 | 354 | 275–300 | 79–54 |
| Wisconsin | 3,645 | 998,585 | 40,000 | 1,279,160 | 274 | 11 | 351 | 15–100 | 336–251 |
| Pennsylvania | 1,417 | 216,845 | 40,000 | 385,985 | 153 | 28 | 272 | 70 | 202 |

*Largely endowed.

## Board of Visitors.

At a meeting of your Board in February of the year 1910, the following ladies and gentlemen were requested by you to act as a Board of Visitors for the year 1910: Mrs. Charles Warren Lippitt, of Newport; Mrs. Frank E. Marchant, of South Kingstown; Hon. Lewis A. Waterman, of Providence; Hon. I. L. Sherman, of Middletown; Chancellor Arnold B. Chace, of Providence; Superintendent Clair G. Persons, of Warren; Dr. Arthur J. Jones, of Providence. Their function was to study conditions, processes, personnel, and management of the college and report to your Board a statement of their findings together with such recommendations as their judgment might approve.

Their report is herewith presented as an appendix to the present report. The college and the people of the State are placed under obligation to the members of this Board for the careful, painstaking and discriminating work which they have done. With a sense of public duty not always found, they have given generously of their time and thought, to the end that this educational instrumentality of the State may become most effective in fostering the welfare of its people. Their estimate of the college work will receive respectful attention from the people of the State and will tend to foster and develop that confidence in the work of the institution which is so necessary to its success. Their recommendations will undoubtedly be considered by your Board and acted upon. I suggest that by a formal vote the thanks of your Board be tendered to each member of this Board.

## Summer School.

In accordance with the plans presented to your Board, a summer school for teachers and others interested was held at the college, from July 11 to August 6, with the active assistance and co-operation of the Rhode Island Normal School. In the beginning, it was intended that two weeks of work here should connect with two weeks of work at the Normal School itself. Shortly before the opening of the summer vacation, the Board of Trustees of the Normal School found itself unable to carry out its part of the plan, and the whole four weeks' instruction was given here. The Normal School provided the services of Mr. Joseph J. Landall in manual training, free of expense to the college except for board. The other instruction was provided and paid for by the college. The instructors were Dr. Arthur J. Jones, Professor C. Edward Fisher, and Mr. Joseph J. Landall, of the Normal School; and President Edwards, Professors Adams, Cobb, Thompson, Merrow, Stene, and Eldred and Mr. Thomas of the college. The attendance numbered thirty-nine. Other information is given in the tables. The reception of the summer-school idea has been such that I earnestly recommend its continuance and enlargement during the coming vacation.

## Farmers' Week.

Another phase of extension work was the farmers' week held December 27–30, inclusive. This meeting was a pronounced success both in numbers and enthusiasm. All the counties of the State were represented, the attendance being especially large from Providence, Kent, and Newport. Last year the attendance numbered 69; this year it was fully 120. Many ladies came in to attend Miss Thompson's lectures.

The following set of resolutions originating with those attending, and drawn up and carried through entirely without request or suggestion on the part of anyone officially connected with the college, is very gratifying as an evidence of appreciation and as a piece of testimony in the move for a science building:

WHEREAS, we, farmers from various sections of Rhode Island and vicinity, during our stay at the State College for the exercises of Farmers' Week, have learned from personal observation of the inadequate facilities afforded for the housing of some of the college science departments, be it therefore

*Resolved*, that we heartily endorse the action of the Board of Managers in its vote of November 21 last, to apply to the legislature for an appropriation of $75,000 for the building and equipping of a suitable building for such departments; and be it further

*Resolved*, that a committee of three be appointed to urge upon the legislature the passage of such appropriation. Be it also

*Resolved*, that we desire to express to the Board of Managers of the college our thanks for the arrangement of the course, to the members of the faculty and others for their valuable lectures and addresses, and to all who contributed in any way to the success of the exercises of the week.

KINGSTON, R. I., December 30, 1910.

## Changes in Faculty.

In April of the year 1910, Professor Jacob A. Fottler requested leave to resign on May 1, in order to take an inviting position in commercial work. Your Board thought it best to release him, although it worked some detriment to the college to have him leave before the end of the college year.

Mr. George E. Peaslee, a graduate of the electrical course at Pratt Institute, in 1905, was selected to take charge of the short course and practical work, and Mr. Fottler's other work was assumed by other members of the department for the remainder of the college year. Mr. Peaslee has had, beside the excellent practical course at Pratt, much experience in industrial work, being engaged with Sampson and Allen, electrical contractors, from June to October, 1905; and with the New England Telephone and Telegraph Co., Boston, Mass., in the engineering department from October, 1905, to January, 1909, and in the sub-license department from January, 1909, to May, 1910.

To take Mr. Fottler's regular course work, Mr. Paul Cloke was engaged in August, 1910, as instructor in physics and electrical engineering. Mr. Cloke was graduated from Lehigh University in 1905, with the degree of electrical engineer. He was then accepted as engineering apprentice with the Westinghouse Electric and Manufacturing Company. He then went with the Public Service Corporation of New Jersey; from that position, was engaged as instructor in physics at The Pennsylvania State College, and finally returned to commercial work as electrical engineer in the research department of the Westinghouse Lamp Company.

Professor Clyde B. Coleman resigned on the first of July. His place was filled by the election of Professor Fred S. Putney. Professor Putney is a New England man by birth and education. He was graduated, 1905, from New Hampshire College with the degree of B. S. From 1905 to 1907, Professor Putney was an assistant to Dr. Armsby, at The Pennsylvania State College. From 1907 to 1908, he was assistant in animal nutrition at the same college. In 1908–09 he was a graduate student in the University of Missouri, and in 1909–10, he became assistant to the Dean of the Department of Agriculture, University of Missouri. Professor Putney has thus had a New England college course in agriculture, scientific work in one of the foremost experiment stations in the country, and practical acquaintance with methods and processes in the West.

On the resignation of Mr. Warren S. Higgins, instructor in mathematics, Mr. Frank H. Bills, B. S., 1910, New Hampshire College of Agriculture and the Mechanic Arts, was appointed to the position.

At the May meeting of your Board, the resignation of Miss E. Josephine Watson, Professor of Languages, was presented. Miss Watson had served the college in this capacity almost from its inception, and had a large circle of friends among the faculty, alumni, and students, who sincerely regretted her action in severing her connection with the college. Strong resolutions expressive of appreciation, respect, and esteem were passed by your Board and by the faculty of the institution.

To fill the position thus vacated, Dr. Frank K. Sechrist was elected professor of English and Modern Languages. Dr. Sechrist is a native of Pennsylvania, receiving his A. B. degree from Lafayette College, in 1892. From 1892 to 1900, he was professor of English in the Central State Normal School, Lock Haven, Penn. In 1898 he received his Ph. D. degree from Lafayette College. From 1900–1910 he was professor of English in the Wisconsin State Normal School, Stevens Point, Wisconsin.

## Student Aid Fund.

At the alumni meeting in June, steps were taken to originate a fund to be loaned to needy students under certain restrictions, and on August 24, I received the following letter, explanatory of the desires and intentions of the alumni in regard to the fund:

President Howard Edwards,
Kingston, Rhode Island.

Dear Sir:—Mr. Chapin T. Arnold, President of the Rhode Island State College Alumni Association, authorizes me to place in the bank the sum of $140.00, the amount already subscribed to the Student Loan Fund, subject to my check. This fund, in accordance with the vote of the Alumni and the action of their committee, is to be loaned to such junior and senior students who, in the judgment of the President of the College, are worthy of help; said loans to be paid back by the student under conditions arranged by the President.

Respectfully,
(Signed) LUCY C. TUCKER,
*Treasurer, Alumni Committee on Student Loan Fund.*

I have accepted the trust, and from year to year shall make to the alumni of this institution a detailed statement of the uses to which the fund has been placed. The alumni of this college are still all comparatively young people, and it is a gratifying indication of their devotion to the institution that they should so soon begin to plan and act for the good of those who follow them here. They could find no more effective way of perpetuating the good they seek to do.

## Recommendations to the General Assembly.

At the November meeting of your Board the following resolutions were authorized:

A. Resolution to appropriate the sum of $75,000 for the construction of a science building to house the departments of chemistry, botany, physics and bacteriology; forty thousand dollars of the said sum to be available in 1911 and $35,000 in 1912.

| | | |
|---|---|---|
| B. Resolution to make appropriation for current and accumulated repairs as per schedule attached | $3,000 00 | |
| To sustain and enlarge the work of the extension department | 2,000 00 | |
| | | $5,000 00 |

In support of Resolution A, a paper has been prepared and addressed to each member of the General Assembly setting forth somewhat in detail the reasons for the recommendation. This paper, together with the letter transmitting it, are subjoined to this report as Appendix B. I insert in this connection a resolution passed by the State Grange.

*Resolved:* 1st. That the State Grange heartily approves the announced forthcoming application of the Board of Managers of the Rhode Island State College, to the General Assembly of the State, for a building properly to house the departments foundational to the courses in agriculture, and to enlarge the space at the disposal of the experiment station.

2nd. That the legislative committee of the State Grange be urged to use its best endeavors toward the passage of a bill embodying the application of the said Board as presented in the printed "statement" laid before this Grange.

3rd. That the Secretary communicate to each subordinate grange a copy of the "statement," and urge on the part of such grange the appointment of a committee to work with the legislative committee of the State Grange, for the passage of the bill.

I would further call attention to the resolution of "farmers week," page 30, and to the statements of the Board of Visitors, page 45, Appendix.

## Commencement.

The baccalaureate address of June 12, 1910, had for its subject, "The Old Order and the New." The commencement exercises the following Thursday were very largely attended. The speaker was Congressman-elect George H. Utter, who made a strong address on the subject, "Stop a Minute!"

Respectfully submitted,

HOWARD EDWARDS,

*President.*

FEBRUARY 9, 1911.

# TREASURER'S REPORT.

R. S. Burlingame, Treasurer, *in account with the different funds of* Rhode Island State College, *for the year ending December* 31, 1910, *as follows:*

## Morrill Fund of 1890.

| 1910. | | Cr. | Dr. |
|---|---|---|---|
| Jan. 1. | To balance from last year | | $21,875 08 |
| July 16. | Cash from United States for year ending June 30, 1911 | | 45,000 00 |
| Dec. 31. | By instruction | $33,362 64 | |
| | Text-books and reference books | 1,166 21 | |
| | Apparatus | 3,395 21 | |
| | Tools and machinery | 597 53 | |
| | Stock and material | 4,256 49 | |
| | Balance on hand | 24,097 00 | |
| | | $66,875 08 | $66,875 08 |

## Morrill Fund of 1862.

| | | | |
|---|---|---|---|
| Jan. 1. | To cash from land-scrip fund | | $2,500 00 |
| Dec. 31. | By instruction | $1,190 06 | |
| | Text-books and reference books | 22 75 | |
| | Apparatus | 106 65 | |
| | Stock and material | 81 29 | |
| | Balance on hand | 1,099 25 | |
| | | $2,500 00 | $2,500 00 |

## State.—Maintenance Fund.

| | | | |
|---|---|---|---|
| Jan. 1. | To State appropriation | | $25,000 00 |
| Dec. 31. | By salaries | $5,843 93 | |
| | Traveling | 544 97 | |
| | Postage, stationery, and printing | 556 27 | |
| | Construction and repairs | 1,518 81 | |
| | Oil and gasoline | 217 30 | |
| | Fuel | 3,351 27 | |
| | Telephone and telegraph | 227 61 | |
| | Feed | 7 25 | |
| | Freight and express | 3 73 | |

| | Cr. | Dr. |
|---|---|---|
| By Labor (student, janitor, farm, etc.) | $10,243 55 | |
| Commencement | 48 63 | |
| Dishes and laundry baskets | 95 48 | |
| Furniture | 365 84 | |
| Rental of dormitories | 292 67 | |
| Wagon and harness repairs | 107 90 | |
| Horse shoeing | 103 66 | |
| Advertising in publications | 421 13 | |
| Membership fee | 35 00 | |
| Stock and material | 1,015 00 | |
| | $25,000 00 | $25,000 00 |

### State.—Dormitory Fund.

| | | | | |
|---|---|---|---|---|
| Jan. | 1. | To balance from last year | | $674 57 |
| Dec. | 31. | By architect | $635 42 | |
| | | Freight and express | 39 15 | |
| | | | $674 57 | $674 57 |

### State.—Athletic Fund.

| | | | | |
|---|---|---|---|---|
| June | 1. | To State appropriation | | $2,750 00 |
| Dec. | 31. | By track house | $1,386 87 | |
| | | Track | 1,211 71 | |
| | | Balance on hand | 151 42 | |
| | | | $2,750 00 | $2,750 00 |

### State.—Repairs and Improvements.

| | | | | |
|---|---|---|---|---|
| May | 1. | To State appropriation | | $4,000 00 |
| Dec. | 31. | By labor and material | $4,000 00 | |
| | | | $4,000 00 | $4,000 00 |

### State.—School and Extension.

| | | | | |
|---|---|---|---|---|
| May | 1. | To State appropriation | | $1,000 00 |
| Dec. | 31. | By salaries | $297 41 | |
| | | Traveling | 39 75 | |
| | | Labor | 64 13 | |
| | | Stock and material | 35 98 | |
| | | Farmers' week | 139 46 | |
| | | Balance on hand | 423 27 | |
| | | | $1,000 00 | $1,000 00 |

### CURRENT FUND.

| | | | CR. | DR. |
|---|---|---|---|---|
| Jan. | 1. | To balance from last year | | $4,073 58 |
| | | Reserve fund | | 2,000 00 |
| | | Dormitory fees | | 3,687 15 |
| | | Department sales | | 5,675 64 |
| | | Department fees | | 1,814 38 |
| | | Department service | | 905 53 |
| | | Tuition | | 880 97 |
| Dec. | 31. | By salaries | $2,448 21 | |
| | | Traveling | 269 53 | |
| | | Postage and stationery | 524 22 | |
| | | Construction and repairs | 1,376 33 | |
| | | Oil and gasoline | 79 84 | |
| | | Fuel | 1,680 56 | |
| | | Telephone and telegraph | 82 30 | |
| | | Labor (student, farm, janitor, etc.) | 3,891 36 | |
| | | Freight and express | 541 57 | |
| | | Advertising in publications | 259 50 | |
| | | Entertainment | 466 99 | |
| | | Stock and material | 2,560 17 | |
| | | Feed | 1 50 | |
| | | Reserve fund | 2,000 00 | |
| | | Balance on hand | 2,855 17 | |
| | | | $19,037 25 | $19,037 25 |

### TRUST FUND.

| | | | | |
|---|---|---|---|---|
| Dec. | 31. | To boarding receipts | | $19,364 41 |
| | | Store receipts | | 3,723 18 |
| | | Interest | | 1,002 35 |
| | | Cash transferred from current fund to remove deficit | | 1,500 00 |
| Dec. | 31. | By debit balance from last year | $1,064 10 | |
| | | Boarding | 18,522 13 | |
| | | Store | 3,417 43 | |
| | | Balance on hand | 2,586 28 | |
| | | | $25,589 94 | $25,589 94 |

### HATCH FUND.—EXPERIMENT STATION.

| | | | | |
|---|---|---|---|---|
| Jan. | 1. | To balance from last year | | $7,066 30 |
| July | 1. | United States check | | 3,750 00 |
| Oct. | 1. | United States check | | 3,750 00 |

| | | Cr. | Dr. |
|---|---|---|---|
| Dec. 31. | By salaries | $8,635 70 | |
| | Labor | 1,987 66 | |
| | Publications | 78 61 | |
| | Postage and stationery | 331 97 | |
| | Freight and express | 222 95 | |
| | Heat, light, water and power | 368 78 | |
| | Chemical supplies | 70 73 | |
| | Seeds, plants, etc | 222 26 | |
| | Fertilizer | 189 65 | |
| | Feeding-stuffs | 747 42 | |
| | Library | 871 85 | |
| | Tools and machinery | 368 04 | |
| | Furniture and fixtures | 23 30 | |
| | Scientific apparatus | 82 07 | |
| | Live stock | 401 00 | |
| | Traveling expenses | 453 95 | |
| | Buildings and land | 887 05 | |
| | Contingent expenses | 40 00 | |
| | To amount overdrawn | | 1,416 69 |
| | | $15,982 99 | $15,982 99 |

## Adams Fund.—Experiment Station.

| | | | |
|---|---|---|---|
| Jan. 1. | To balance from last year | | $6,206 85 |
| July 1. | Check from United States Treasury | | 3,750 00 |
| Oct. 1. | Check from United States Treasury | | 3,750 00 |
| Dec. 31. | By salaries | $9,383 89 | |
| | Labor | 2,453 73 | |
| | Postage and stationery | 121 41 | |
| | Freight and express | 93 51 | |
| | Library | 55 95 | |
| | Tools and machinery | 126 85 | |
| | Scientific apparatus | 170 65 | |
| | Chemical supplies | 116 35 | |
| | Furniture and fixtures | 75 50 | |
| | Feeding-stuffs | 842 54 | |
| | Live stock | 113 90 | |
| | Traveling | 182 15 | |
| | Seeds and plants | 251 86 | |
| | Building and land | 25 52 | |
| | Heat, light, water and power | 279 77 | |
| | Fertilizer | 148 82 | |
| | To amount overdrawn | | 735 55 |
| | | $14,442 40 | $14,442 40 |

### MISCELLANEOUS.—EXPERIMENT STATION.

| | | | Cr. | Dr. |
|---|---|---|---|---|
| Jan. | 1. | To balance from last year | | $5,790 46 |
| | | Department receipts | | 1,856 37 |
| | | Interest | | 127 03 |
| Dec. | 31. | By salaries | $738 69 | |
| | | Labor | 429 65 | |
| | | Postage and stationery | 91 28 | |
| | | Freight and express | 56 33 | |
| | | Library | 85 62 | |
| | | Tools and machinery | 49 93 | |
| | | Live stock | 2 00 | |
| | | Chemical apparatus | 3 74 | |
| | | Publications | 61 56 | |
| | | Feeding-stuffs | 68 86 | |
| | | Heat, light, water and power | 18 36 | |
| | | Traveling expenses | 469 60 | |
| | | Building and land | 1,921 07 | |
| | | Seeds, plants, etc | 163 83 | |
| | | Scientific apparatus | 31 10 | |
| | | Contingent expenses | 21 85 | |
| | | Balance on hand | 3,560 39 | |
| | | | $7,773 86 | $7,773 86 |

I hereby certify that the above account is correct and true, and truly represents the details of expenditures for the period and by the institution named.

R. S. BURLINGAME,

*Treasurer.*

This is to certify that we, the undersigned, auditing committee of the Board of Managers of Rhode Island State College, have examined the accounts of R. S. Burlingame, treasurer of said college, and find the same correct.

CHARLES DEAN KIMBALL,
THOMAS G. MATHEWSON,

*Auditors.*

# REPORT

OF THE

# BOARD OF VISITORS

OF

# RHODE ISLAND STATE COLLEGE

# FOR 1910.

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## APPENDIX A.

# REPORT.

*To the Board of Managers of Rhode Island State College:*

Gentlemen:—The Board of Visitors, appointed in January, 1910, has the honor to present to you the following report:

At the first meeting a simple organization was effected, with Dr. Arthur J. Jones, of Providence, as chairman, and Superintendent Clair G. Persons, of Warren, as secretary. (In September, 1910, Superintendent Persons removed from the State and was obliged to resign from the Board.) Plans of work were discussed, and the work of inspection and visitation was systematized and divided in such a way as to make possible a very thorough and complete investigation. We have attempted to make this Board a real investigating committee and not a merely perfunctory body, to the end that we might be of the utmost possible service to the college and to the State. We have, individually and as a Board, inspected every department of the college, have talked with the instructors and with other people who could give us information concerning the work of the college and its general standing in the community, and have endeavored in every way to ascertain the facts which would aid us to make our report of real value.

## GENERAL ENVIRONMENT.

The college is especially fortunate in its location. There are few places in the State which are so beautiful and so healthful. The comparative isolation of the college, while causing some inconveniences, makes possible a true college community life and enables the institution to exert a more complete and far reaching influence over all its students. The general relationship between the college and the community seems to be helpful and healthful. The college has a wholesome and distinctly helpful influence on the community.

## SOCIAL LIFE.

Such opportunity as we have had for observing the social life of the students indicates that it is thoroughly wholesome. The students seem earnest and eager and there is a strong, healthy college spirit which binds them together as nothing else can do.

## BOARDING DEPARTMENT.

We wish to express our approval of the present management of the boarding department. It is evidently in competent hands. The food is well cooked, of good quality, and of sufficient variety. It hardly seems possible that any better board could be provided for the money than is given here.

## HOME ECONOMICS.

This department is in most capable hands and the equipment seems adequate for present needs, though the growth and expansion of this very important branch of the college training should be kept in mind, in planning for the future. The Board expresses its disapproval, however, of the absence of proper laundry facilities for the women students, the large proportion of whom are forced to use entirely inadequate and undesirable quarters in an ill-lighted, unclean, and unsanitary basement of a building used by male students. We recommend that better laundry arrangements be made at once, and that plans be completed for permanent facilities both for actual use, and for adding this very necessary branch of study to the department of home economics, as soon as other quarters can be found for the physics department.

## DORMITORIES.

After a careful examination of the dormitories for both men and women, we find that these facilities for the students are, on the whole, very satisfactory and the price charged exceedingly reasonable.

## EXPERIMENT STATION.

The work of the experiment station is of a very high order and has been and is of great value, not only to the people of the State, but also to the nation. It is imperative that more room be provided for this department. To this end we hope that as soon as possible all books not needed in the daily work of the station may be given a place elsewhere, and that some room may be set apart in the proposed science building, where some of the work of this department may be carried on. We would again emphasize the value of a closer union between the experiment station and the other departments of the college. Some way should be devised by which the valuable investigations conducted by this department could be utilized more fully than they now are for the benefit of the college students. It would seem desirable, if it could be arranged, that those who are conducting such experiments should present their methods and their results to the students of the college, especially to those who are enrolled in the courses in agriculture. The unusual opportunities which the experiment station presents for the observation of original investigations at first hand should be utilized as fully as possible. It would hardly seem that the administrative difficulties incident to such a union would be sufficient to counterbalance the benefits derived from the conservation of materials and of energy and the general gain in efficiency which would result from such united purpose and united action.

## AGRICULTURE.

We note with approval the large increase in the number of students enrolled in agricultural courses and the constantly increasing importance of this department. Agriculture is one of the most important industries of the State and it is evident that a college of this kind, founded under the provisions of the Morrill Act of 1862, should be of the utmost possible service to the agricultural interests of the State. We recognize the fact that the college never can be wholly an agricultural school and that it never should be, but we feel that the agricultural interests of the State justify a still greater emphasis upon this side of the work.

While we feel that the general policy of the college can be wisely determined only by those in actual charge, who have studied the situation from all sides, we feel that the college is wise in considering carefully all honest criticisms of the farmers and in attempting to remove as soon as possible all grounds for the same in so far as they are well founded. Money should be judiciously expended in the purchase of the best materials, machinery, and stock, and special care exercised in the general care and upkeep of the farm. If necessary, an appropriation should be asked for, to meet such needs. It is especially desirable that more farm land be utilized for the agricultural work of the students; all available land should be utilized to this end, and if the amount of land still proves insufficient, effort should again be made to secure enough land to give the agricultural students more practice in actual farm work. The college should be careful never to neglect this practical side of agricultural training. It is not only necessary that the students be taught the best methods, but they should have practical illustration of them and should be given a great deal of practical training in them. No subjects lend themselves more readily to laboratory or field work than agriculture and kindred pursuits. Because of this very fact there often is a tendency to neglect this side of the subject, to study the theory and neglect the practice, to assume that the practice is unnecessary and has been or may be acquired elsewhere. In mechanics there is regular work in the machine shop, in chemistry the students are required to work in the laboratory, in engineering we have actual field work, but in agriculture, with all the opportunities for field work, that work is likely to be neglected.

The grounds, the gardens, the orchards, the poultry yards and houses, and the stables of an agricultural school or college should in themselves be a daily lesson in scientific farming. The teaching of the theory would lose somewhat of its force if negatived by the daily observation of the students, while, on the other hand, how can you better instill into the minds of the students the lessons that you would teach than by daily practical observations? Nor would this require a tremendous expenditure. That would not be practical agricultural training, it would be gentleman's agriculture. The students should be taught commercial agriculture, how to make farming pay. The best methods of raising and keeping poultry should not only be taught, but there should be practical training in them. They should be given practical lessons in the care and breeding of live stock. They should be taught how to make butter and cheese and to do all the work necessary to constitute first-class and up-to-date farmers.

It should be the aim of the college to perfect itself as soon as possible in this branch of the work. It is the only institution in the State engaged in this line, and for this reason, if for no other, it should do its utmost to supply this need. The college has made rapid strides in this direction during the past few years, but much remains to be done before it will satisfy the demands of the people of the State in this connection.

### DEPARTMENTS OF SCIENCE.

Adequate courses in agriculture and allied subjects cannot be given unless there be thorough training in the subjects fundamental to such work. Agriculture to-day is an applied science and thorough training in science must precede and accompany such application. The sciences most closely connected with agriculture are chemistry, botany, bacteriology, and physics. If students are not thoroughly grounded in these fundamental subjects there can be little hope for the production of agricultural experts by the college. The departments of science are especially fortunate in their equipment, which is largely provided from the funds given by the government. Excellent work is done in these departments, but the quarters are entirely inadequate to meet the needs of the students and of such a character as to render constant apology necessary. The buildings used by the departments of chemistry and botany are mere sheds, and not even adequate for the shelter of the apparatus, which, in consequence, cannot be properly cared for. The rooms occupied by the physics department are unsuited to experimentation and to the housing of the valuable apparatus owned by the college.

In view of these facts, we feel that the Board of Managers is entirely justified in its application for an appropriation for a new science building, we approve of such action, and hope that it may meet with the approval of the members of the General Assembly as it has with that of the Governor. As is indicated in the application for such appropriation, such a building, in addition to meeting the needs of the science departments, would give the experiment station much needed room, would provide for a closer union between the experiment station and the rest of the college, and would make available for the use of the women the basement of Davis Hall, now used by the department of physics.

### EXTENSION DEPARTMENT.

The department of the college that most directly meets the needs of those actually engaged in agricultural pursuits and that comes into closest contact with the farmers is the extension department.

The farmers of the State have already been greatly benefited by the lectures, conferences, demonstrations, pamphlets, and letters which have been furnished through this department. They are coming to appreciate the efforts of the college in this direction more and more, because they see the benefits of such work. This appreciation is evidenced by the attendance at these lectures and demonstrations, by the great interest in "farmers' week," by the increasing requests for assistance, and by the general friendly attitude of the farmers towards the college. There is no reason why this work should not increase in amount and in usefulness. Sufficient funds should be made available for the enlargement of this department.

## SCHOOL GARDENING.

The work done for the State in school gardening by the college, through Mr. Thomas, has been unusually helpful and of real service to the people. The interest in the movement has been constantly growing and the work done has been of the solid, practical character which is the best guarantee of lasting influence. Practically all of the time of Mr. Thomas has been given to this work, very little being available to the college for its own courses. The money used by the college for this work has come from its regular resources, no extra appropriation being asked for.

## ENGINEERING DEPARTMENT.

We find the engineering department well equipped with up-to-date apparatus and the instruction given practical and of a high order. Unusual opportunities are here offered to students taking such courses.

## PLANS FOR THE FUTURE.

We commend the sincere attempt of the Board of Managers and of the president to carry out the recommendations of the Commission of Inquiry which reported to the General Assembly April 16, 1909. We especially approve the attitude of your president, expressed in his report for 1910, pages 31 and 32, relative to the necessity of placing before the people a constructive program of development covering several years. It is no longer necessary to convince the people of the State of the value of the college. It stands on its own splendid record of past achievement. The people of the State and the members of the General Assembly should, however, know the needs of the college, and a plan should be drawn up covering the prospective needs for a number of years to come. This plan should, in some way, be brought to the attention of the General Assembly so that provision may be made in advance for meeting these needs. We feel that the recognized worth and dignity of the college make any other course unwise, and also that such a course will appeal to the good sense and judgment of the citizens of the State.

On the whole, we feel that, while the buildings and equipment are inadequate in many ways, while there are pressing needs, the college is doing work of which the State may well be proud. The members of the faculty are earnest and conscientious, and the standard of work done compares favorably with that of other New England colleges. The college is, in an ever-increasing degree, meeting the needs of the State and fulfilling the purpose of its founding. It is appealing to a class of young people not reached by any other educational institution in the State, and is offering them excellent opportunities for practical as well as cultural training.

Respectfully submitted,

ARTHUR J. JONES,
ISAAC L. SHERMAN,
(MRS. F. E.) SARAH P. MARCHANT,
(MRS. C. W.) MARGARET B. F. LIPPITT,
ARNOLD B. CHACE,
LEWIS A. WATERMAN.

# APPENDIX B.

## STATEMENT IN RELATION TO FORTHCOMING APPLICATION BY THE BOARD OF MANAGERS OF RHODE ISLAND STATE COLLEGE TO THE GENERAL ASSEMBLY OF THE STATE OF RHODE ISLAND FOR A SCIENCE BUILDING AT RHODE ISLAND STATE COLLEGE.

1. ACTION OF THE BOARD. At a regular meeting of the Board of Managers of Rhode Island State College held November 21, 1910, after considering the situation as apparent to themselves and as presented by the heads of departments concerned, and after viewing preliminary plans for a new science building to house the departments of chemistry, botany, bacteriology and physics, the Board unanimously

Voted, to apply to the Legislature for the appropriation of $75,000 for building and equipping the said Science Hall, asking that $40,000 be made available during the year 1911 and $35,000 during the year 1912.

2. OBJECT OF THE RESOLUTION. To enable the college properly to discharge its function of experimentation and instruction in agriculture, in home economics, and in the course for teachers, etc., provided for in the Nelson Amendment of 1907.

3. CONNECTION OF THIS RESOLUTION WITH THE OBJECT TO BE ATTAINED. The subjects of chemistry, botany, bacteriology, and physics are fundamental to any serious course in agriculture, home economics, etc. Agriculture *is* these subjects applied, and there can be no solid application of subjects not previously acquired. No college worthy of the name attempts to give these applications without these subjects. Equally as a matter of course, no investigation or experimentation can be carried on without expert work in these subjects.

4. REASONS FOR IMMEDIATE ACTION.

A. Present space and buildings unsatisfactory.

(a) The chemistry building is an unceiled wooden shack, 115 ft. long by 24 ft. wide and affording 2690 sq. ft. of floor space. It was originally constructed as temporary barracks for housing students while the dormitory, burned January 23, 1895, was being rebuilt. It is in every way unsuited for its present use. At the best, it affords for general chemistry, qualitative and quantitative analysis, organic chemistry, physiological chemistry, etc., only one general laboratory and a small lecture-room, while for industrial chemistry, a store room and weighing room, two small sections are cut off. Adequately to provide in floor-space alone for the needs of this department would require some 8000 square feet. Views of the exterior and interior are subjoined.

(b) The building for botany is likewise a temporary wooden cabin, 36 x 16 ft. (576 sq. ft. of floor-space) with room up in the eaves for storage; the whole not exceeding 800 sq. ft. of floor-space. This single room serves as both laboratory and lecture-room for work in general botany, economic botany, plant pathology, histology, etc. For this department at least 5,000 sq ft. of space are needed. Views are subjoined.

(c) Bacteriology. This subject constitutes in modern agriculture—in the study of plant and animal life of all kinds, including the food and sanitation of human life—a vital feature. Yet so far, for lack of space, little has been done at Rhode Island State College in grounding students in the subject. For experimental purposes the department occupies two rooms in the experiment-station building, a total of 881 sq. ft. of floor space. For both experimental and teaching purposes, it should have some 2,800 sq. ft.

(d) The department of physics now has four rooms in the basement of Davis Hall—a total floor space of 1,656 sq. ft. For compactness, propriety and convenience of arrangement this space is needed more especially for the Women's Department, as for laundry, gymnasium, etc. The department of physics is, further, inconvenienced by lack of space for properly handling the subjects of light, photography, etc. It should have at least 2,600 sq. ft. of floor space.

B. Increase of demands on departments originally unsatisfactorily provided for in floor-space and buildings.

The foregoing is a statement of facts, presented without argument, and in exact figures. As to botany and chemistry they show a condition at no time satisfactory or worthy of the state. But meanwhile demands have increased. The comparisons here made to show such increased demands cover merely the time from 1906 to 1910—the period, namely, during which affairs at the college have been intrusted to the present administration.

(a) A different kind of teaching is demanded. The report of President Butterfield for 1906 gives a total of 105 students, of whom 44 were avowedly doing high-school work, while 61 were registered as students of college grade. A glance at the course will show for the 44 students very little of science or laboratory work. We have no preparatory students at the college to-day.

Even the 61 students in the college do not seem to have been prepared to do the grade of scientific work now demanded by our students. The President states that of the freshman class only eleven were "from high schools." The forthcoming report for 1910 will show some 50 high-school graduates in the present entering class, with the remainder admitted on three conditions or less.

This same situation is shown by the announced requirements for entrance. For 1906 they amounted to barely eight units, that is, an amount of work equal to about two and one-half years in the high school. For the year 1910, the requirements were thirteen units, or practically high-school graduation from a four-year course. With substantially no change in the number of entering students, the college could have required the full fourteen units that will be required in 1911. All this means that the work demanded by students at this college to-day is of full college grade, and requires an equipment correspondingly elaborate.

(b) Not only has the character of the work materially advanced, but the volume of work demanded has greatly increased. For the 61 college students of 1906 we have, in 1910, 152, or about two and one-half times as many. The graduates in 1905 were 8 in number; in 1910, they were 16. The entering class in 1906 (with 8 units for entrance) numbered 17; in 1910 (with 13 units for entrance) it numbered 64, or nearly four times as many. Furthermore, instead of the additional 44 high-school students enrolled in 1906, we have in 1910 twenty-eight students in two-year courses arranged for persons beyond the high-school age, and connecting, not with college work, but with actual industrial life. This work makes almost as much demand upon the science laboratories as does the college work, only it is different in character.

Added to this is the summer-school work for teachers of agriculture and kindred scientific subjects (thirty-nine were enrolled in this school last summer); and the "farmers' week" course during the winter holidays with an attendance last year of some 65 actual farmers. Even the six weeks' poultry course (enrolling twenty poultrymen) makes some demand on the science laboratories.

C. Increase of demands upon the experiment station and of opportunities for usefulness.

In the Report for 1906 the income of the station from the United States Government is given as $15,000. In that year the Adams Act gave to the station the additional sum of $7,000, increasing each year by $2,000 until, in 1910, it has reached the maximum of $30,000. None of this can be used for buildings. But it is evident that if the income of the station is doubled, the work done should be doubled, and that means, in part, additional floor-space in which to work. Yet in the four years, the college has been able to add to the floor space given over to experimental purposes only very slightly—by withdrawing, namely, instructional work from the experiment-station building, three rooms of which were used in 1906 mainly for such instructional purposes. Even so, the experimental work is greatly crowded and handicapped by lack of space. To do his best work, the Director should have a private office. A fire-proof vault is needed for the preservation of invaluable records. All the divisions of the work need enlarged facilities.

As the experiment-station building itself is unfitted for addition, the necessity for removing some department to another building is indicated. It is, therefore, proposed to remove the bacteriological department to the new science building contemplated, giving to it space for both research and instructional work, and releasing for the use of the Director and for adjustment to the needs of the remaining departments about one-fourth of the present building.

D. Failure of present conditions to meet obligations formally assumed by the State in accepting grants from the United States, and to foster economic and successful work.

The yearly income from the United States to the State for this college will be, in 1911, $82,500, including $30,000 for experiment-station work. This, capitalized at 5% is equivalent to an endowment of $1,650,000. In accepting this grant, the obligation explicitly assumed by the State in a formal act, is that it shall furnish adequate land, buildings, and maintenance, so that the fund from the United States may be used to best advantage for apparatus, teaching, and investigation. As has been pointed out, two of the main departments are in buildings grotesquely unsightly, inadequate, unsuitable, unsanitary, and uneconomic.

A very high grade of work is now being done by this college. Although only four additions have been made to the number of the college faculty in the four years, and one of these is the military officer detailed and paid for by the United States (an increase, therefore, of only 16⅔% in college faculty as compared with an increase of 146% in college students), yet the personnel has been greatly changed and strengthened. Better salaries are being paid, the increase in some cases being over 38%: while the whole salary list has increased 28%. But this better work is being done against great disadvantages in the conditions named. A great teacher and investigator counts opportunities and facilties for good work as the principal attraction inhering in a given position. Both faculty and students here are upborne by the present hope of improved conditions, and the failure to recognize the good work being done by refusing to improve the conditions will bring inevitable disappointment, disorganization, and retrogression.

On the other hand, improved conditions realized or in immediate prospect, will bring renewed courage, greater effort, more marked progress. While the increase in agricultural students (8 in 1906, 45 in 1910) is very gratifying, all of us desire further growth in this direction. Such growth can be brought about only by the improvement asked for. Over and over again it has been demonstrated that better buildings *precede* the influx of agricultural students. In Cornell, Wisconsin, Illinois, Michigan and elsewhere, the enormous increase of agricultural students has come, in every case, as the direct result of generous building.

## 5. DESCRIPTION OF PROPOSED BUILDING.

The building proposed is to be of stone, 130 x 45 ft., with a projecting center, 50 x 20 ft., three stories in height and having a dry, well-lighted basement. The space so obtained has been carefully reckoned to meet the needs of a body of 300 students divided among the departments in the relative proportions now obtaining.

An estimate from a responsible builder places the cost of the building at $55,000. The cost of equipment and installation has been reckoned at $20,000.

Besides the halls, toilet rooms, cloak rooms, etc., it will be apportioned as follows:

(a) For chemistry, 7,903 sq. ft, of floor-space
as against 2,690 sq. ft. of floor-space in present quarters.
(b) For botany, 5,232 sq. ft. of floor-space
as against 832 sq. ft. in present quarters.
(c) For bacteriology, 2,723 sq. ft. of floor-space
as against 881 sq. ft. in present quarters.
(d) For physics, 2,681 sq. ft. of floor-space
as against 1,656 sq. ft. in present quarters.

A modern lecture-room with seats in semi-circular form in tiers rising one above the other and a demonstration table in the focus, will constitute a much-needed feature of the building.

## 6. RECOMMENDATION OF THE COMMISSION OF INQUIRY OF 1908–09.

In making this application, the Board of Managers of the college would make formal reference to the Report of the Commission of Inquiry appointed by the General Assembly, May 26, 1908, as fully sustaining this action, and as testifying authoritatively to the duty of making such application. This Report was made by a body of able and conscientious men with no interest to serve other than that of the state, with no preconceived judgments and no theory to sustain. They carried forward their task with the most serious and painstaking effort, giving unstintingly of their time; and making a minute and detailed examination of all matters pertaining to the college. Their report is restrained and judicial in tone, yet sustains positively and unequivocally all that is insisted upon in this application and the application itself is, in effect, made by the Commission. See pages 63–68 of the report.

7. GENERAL SUMMARY. The State has here in active work a genuine *College* of Applied Science in Agriculture, Home Economics, Applied Science Teaching, and Engineering. The teaching and investigation here carried on is highly valued by a large part of the population, as is shown in the demand for its publications and its advice, in the four-fold increase of its clientele from the high schools in four years' time and in the growing attendance on its short-course practical work.

It is enabled by the equivalent of an endowment from the United States Government of $1,650,000 and by maintenance from the state, to offer its services free to the people of the state and hence brings largest aid to the classes most in need of such aid.

In order to carry out its function in the state, it needs further aid to erect a building suitable for its purposes.

A three-fold obligation to supply this need rests upon the state: (a) to provide for its own people that which other states have so bountifully provided for their people, (b) to give to the people the full measure of advantage that should come to them from the munificent endowment of the United States, and (c) to meet the obligation assumed in the Act accepting the grant.

The foregoing facts are fully substantiated and are strongly and ably set forth in the Report of the Commission of Inquiry on the College made to the General Assembly April 16, 1909.

"IGNORANCE IS A GREATER BURDEN ON A STATE THAN TAXATION."

## SUMMARY OF ACCOMPANYING PAPER.

1. Appropriation for Science Building asked by Board of Managers of Rhode Island State College—$75,000 for building and equipment—$40,000 available in 1911; $35,000 in 1912.
2. Purpose—To relieve congestion in the Experiment Station and properly to house the work in Chemistry, Botany, Bacteriology, and Physics.
3. Relation of these departments to the courses in Agriculture, Home Economics, Applied Science, etc., is vital.
4. Reasons for immediate action:
    - A. Present space and buildings for these departments inadequate. See pictures.
    - B. Increase of demands on these departments.
        - a. Advanced character of work.
            1. No preparatory work now at the College.
            2. Entrance requirements advanced from 2½ years of high-school work to graduation from high school.
            3. Short-course practical work for adults with or without high school training.
        - b. Increase in volume of work.

          In four years, an increase of College Students of 146% (nearly 2½ times as many.) Senior Class doubled; Freshman Class nearly four times as many. Substitution of short-course practical work for preparatory high-school work at the College.
    - C. Increase of Experiment Station income (from U. S.) from $15,000 to $30,000 necessitates increased space for work.
    - D. Present buildings for these departments do not meet obligations formally assumed by the State toward the United States. Yearly income from U. S. after 1911 for apparatus, teaching and investigation, $82,500. High grade of work now being done handicapped by present conditions as to buildings.
5. Proposed building to be of stone, 130 x 45 feet, with projecting center, 50 x 20 feet, three stories in height with basement. Space for Chemistry, Botany, Bacteriology, and Physics. Builders' estimate for building, $55,000. Equipment, $20,000.
6. Commission of inquiry appointed by Legislature in 1908 and formally reporting in 1909 uphold foregoing statements and themselves recommend building asked for.

# LETTER OF TRANSMISSION

## ACCOMPANYING FOREGOING COMMUNICATION.

Dear Sir:—By instruction of the Board of Managers of this college, I am enclosing herewith a copy of a paper setting forth the reasons for the introduction of a resolution in the present General Assembly, authorizing the construction and equipping of a science building.

In determining the amount asked for in this resolution, painstaking estimates have been obtained from experts in the lines of work concerned, and no inflation of figures, to allow for possible cutting of the amount asked for, has been practiced. The figures are placed before you according to business practice, just as the manager of some railroad or manufacturing firm would place his estimates before his directors. They are as follows:

| | |
|---|---|
| Erection of building (detailed estimate from responsible contractor, using our quarry for stone) | $55,000 00 |
| Necessary increase of present power plant for heating and lighting | 6,850 00 |
| Installation of lighting fixtures | 500 00 |
| Installation of physics department | 685 00 |
| Installation of chemical department | 4,600 00 |
| Installation of botanical department | 2,050 00 |
| Installation of bacteriology department | 2,395 00 |
| Transmission of heat from power plant to building | 2400 00 |
| Miscellaneous (curtains, cover for corridors, light transmission, etc). | 500 00 |
| | $74,980 00 |

The project has received the approval of the Governor—see message; the State Grange, who instructed committees to appear at any hearings that may be held; the attendants at Farmers' Week here, who also appointed a committee to represent them before the General Assembly; the Board of Visitors of the college for 1910, consisting of Dr. Arthur J. Jones, Chancellor Chace, Hon. Lewis A. Waterman, Hon. I. L. Sherman, Mrs. Charles Warren Lippitt, and Mrs. Frank E. Marchant; and the Commission of Inquiry appointed in 1908. The formal action of the State Grange will be published in the forthcoming report of the Board of Managers, which will also contain the action of the attendants at Farmers' Week. The full report of the Board of Visitors will be forwarded to the General Assembly with the report of the Board of Managers.

It is the duty of the Board of Managers to lay before you the needs of this institution, and to have them as fully and strongly presented as the facts will warrant. In the discharge of that duty, this paper is presented for your consideration. With you rests the responsibility of final decision. Any further information you may desire from us, to help you in arriving at a decision, will be gladly furnished. Reply to this communication will be greatly appreciated.

Very truly,

HOWARD EDWARDS,

*President.*

# APPENDIX C.

## Summaries Dealing with Certain Phases of Receipts and Expenditures for Year ending June 30, 1910.

### SUMMARY FOR YEAR.

| | |
|---|---|
| Balance on hand, July 1, 1909 | $60,675 02 |
| Total income for year | 139,753 38 |
| Total | $200,428 40 |
| Total expenditure for year | 169,007 48 |
| Balance on hand | $31,420 92 |

### INCOME.

| | | |
|---|---|---|
| Income from students: | | |
| Tuition fees | $1,000 02 | |
| Matriculation and incidental fees | 1,660 46 | |
| Chemicals, and laboratory supplies | 866 37 | |
| Dormitory fees | 3,239 19 | |
| Dining hall | 16,849 14 | |
| | | $23,615 18 |
| Income from Grants by State and Nation: | | |
| State—Maintenance appropriation | $25,000 00 | |
| Repairs and improvements | 4,000 00 | |
| Athletic field and house | 2,750 00 | |
| Federal—Morrill Act of 1862 | 2,500 00 | |
| Morrill Act of 1890 and 1907 | 40,000 00 | |
| | | 74,250 00 |
| Hatch Act of 1887—Experiment Station | $15,000 00 | |
| Adams Act, 1906—Experiment Station | 13,000 00 | |
| | | 28,000 00 |

| | | |
|---|---|---|
| Income from Other Sources: | | |
| Sales and service of departments | $12,103 26 | |
| Experiment station receipts | 1,784 94 | |
| | | $13,888 20 |
| Total income | | $139,753 38 |

### Summary of Balances, July 1, 1909.

| | | |
|---|---|---|
| Balance from Morrill Fund of 1862 | $672 93 | |
| " " Morrill Fund of 1890 | 1,400 69 | |
| " " State—Maintenance | 7,697 35 | |
| " " " Dormitory | 32,144 64 | |
| " " Current Fund | 13,103 75 | |
| " " Reserve Fund | 2,000 00 | |
| " " Miscellaneous—Experiment station | 5,883 82 | |
| | | $62,903 18 |
| Balance from Trust Fund, debit account | | 2,228 16 |
| Net Balance | | $60,675 02 |

### Receipts from Tuition.

| | | | |
|---|---|---|---|
| Number of students registered | | 200 | |
| Number of students paying tuition | a. Regular | 41 | |
| | b. Poultry | 16 | |
| | | | 57 |
| Receipts from tuition | a. Regular | $877 32 | |
| | b. Poultry | 122 70 | |
| | | | $1,000 02 |
| Rate of tuition paid per non-resident student yearly | | | 30 00 |
| Rate of tuition paid per non-resident student for six weeks' poultry course | | | 5 00 |

## CASH ACCOUNT WITH DEPARTMENTS EXCLUSIVE OF EXPERIMENT STATION.

| DEPARTMENT. | SALARIES. |  |  |  | Clerks, Stenographers, Officers. | Cost of Equipment, Books, etc. | Receipts. | Net Cost of Department, Exclusive of Salaries. |
|---|---|---|---|---|---|---|---|---|
|  | Professors. | Instructor. | Assistant. | Total Teaching. |  |  |  |  |
| Agronomy | $1,800 00 | $13 90 | ........ | $1,813 90 | ........ | $227 84 | ........ | $227 84 |
| Art | ........ | 625 00 | ........ | 625 00 | ........ | 66 82 | $20 31 | 46 51 |
| Botany | 1,250 00 | 144 10 | ........ | 1,394 10 | ........ | 343 57 | 12 75 | 330 82 |
| Buildings | ........ | ........ | ........ | ........ | $750 00 | 12,972 63 | 4,182 15 | 8,790 48 |
| Chemistry | 1,966 40 | 1,000 00 | ........ | 2,966 40 | ........ | 852 33 | 559 99 | 292 34 |
| Civil Engineering | 1,700 00 | ........ | ........ | 1,700 00 | ........ | 649 99 | 5 53 | 644 46 |
| College Maintenance | ........ | ........ | ........ | ........ | 5,859 84 | 8,343 92 | 2,732 05 | 5,611 87 |
| College Service | ........ | ........ | ........ | ........ | ........ | 4,898 05 | ........ | 4,896 70 |
| Dairy | 1,250 00 | 906 00 | ........ | 2,156 00 | ........ | 2,123 47 | 1,384 51 | 738 96 |
| Dairy, Peckham | ........ | ........ | ........ | ........ | ........ | 354 88 | 28 32 | 326 56 |
| Electrical Engineering | 833 30 | 500 00 | ........ | 1,333 30 | ........ | 589 28 | 7 88 | 581 40 |
| Extension | 800 00 | 291 66 | ........ | 1,091 66 | 379 32 | 981 67 | 14 79 | 966 88 |
| Farm | ........ | ........ | ........ | ........ | ........ | 3,801 86 | 3,533 57 | 268 29 |
| Fire | ........ | ........ | ........ | ........ | ........ | 105 87 | ........ | 105 87 |
| Garden | ........ | ........ | ........ | ........ | ........ | 42 91 | 4 37 | 38 54 |
| Geology | 133 20 | ........ | ........ | 133 20 | ........ | ........ | ........ | ........ |
| Greenhouse | ........ | ........ | ........ | ........ | ........ | 1,212 59 | 991 48 | 221 11 |
| Home Economics | 1,333 34 | ........ | ........ | 1,333 34 | ........ | 397 86 | 45 82 | 352 04 |
| Horticulture | ........ | 958 34 | $500 00 | 1,458 34 | ........ | 166 08 | 20 25 | 145 83 |
| Land Improvement | ........ | ........ | ........ | ........ | ........ | 120 60 | ........ | 120 60 |
| Language | 2,333 34 | 666 68 | ........ | 3,000 02 | ........ | 3 53 | ........ | 3 53 |
| Library | ........ | ........ | ........ | ........ | ........ | 842 46 | ........ | 842 46 |
| Mathematics | 1,500 00 | 500 00 | ........ | 2,000 00 | ........ | 33 17 | ........ | 33 17 |
| Mechanical Engineering | 2,200 00 | 1,833 34 | 360 23 | 4,393 57 | ........ | 1,717 88 | 171 42 | 1,546 46 |
| Military | ........ | ........ | ........ | ........ | ........ | 113 82 | ........ | 113 82 |
| Physics | 1,116 70 | 476 66 | ........ | 1,593 36 | ........ | 169 57 | 10 04 | 159 53 |
| Political Economy | 900 00 | ........ | ........ | 900 00 | ........ | 2 20 | ........ | 2 20 |
| Poultry | ........ | 1,414 40 | ........ | 1,414 40 | ........ | 1,954 70 | 1,603 46 | 351 24 |
| Power | ........ | ........ | ........ | ........ | ........ | 3,004 04 | 436 63 | 2,567 41 |
| Printing | ........ | ........ | ........ | ........ | ........ | 346 27 | 413 31 | *67 04 |
| Roads and Lawns | ........ | ........ | ........ | ........ | ........ | 691 73 | ........ | 691 73 |
| Sheep and Swine | ........ | ........ | ........ | ........ | ........ | 3 92 | 44 09 | *40 17 |
| Telephone and Telegraph | ........ | ........ | ........ | ........ | ........ | 414 14 | 31 13 | 383 01 |
| Water | ........ | ........ | ........ | ........ | ........ | 1,306 19 | 123 25 | 1,182 94 |
| Woodworking | ........ | 750 00 | ........ | 750 00 | ........ | ........ | 7 80 | *7 80 |
| Zoölogy | 1,500 00 | ........ | ........ | 1,500 00 | ........ | 318 87 | 42 33 | 276 54 |
| Boarding | ........ | ........ | ........ | ........ | ........ | 17,046 81 | 19,106 31 | *2,059 50 |
| Stone | ........ | ........ | ........ | ........ | ........ | 3,228 21 | 3,379 88 | *151 67 |
| Total | $20,616 28 | $10,080 08 | $860 23 | $31,556 59 | $6,989 16 | $69,449 73 | $38,913 42 | $30,534 96 |

* Credit.

# TWENTY-THIRD ANNUAL REPORT

OF THE

# BOARD OF MANAGERS

OF

# RHODE ISLAND STATE COLLEGE,

MADE TO THE

General Assembly at its January Session, 1911.

## PART III—CATALOGUE.

Part I—General Report—printed under separate cover.

Part II—Experiment-Station Report—printed under separate cover.

Providence, R. I.
E. L. Freeman Company, State Printers.
1911.

# Rhode Island State College.

## Corporation.

Hon. ROBERT S. BURLINGAME........................Newport County.
Hon. CHARLES ESTES..................................Bristol County.
Hon. CHARLES DEAN KIMBALL..................Providence County.
Hon. THOMAS G. MATHEWSON.........................Kent County.
Hon. J. V. B. WATSON...........................Washington County.
Hon. WALTER E. RANGER..State Commissioner of Schools, *ex-officio*.
Hon. PHILIP A. MONEY......Member of State Board of Agriculture.

## Officers of the Corporation.

Hon. CHAS. DEAN KIMBALL, President.....................Providence.
Hon. ROBERT S. BURLINGAME, Clerk and Treasurer..........Newport.

# Report.

*To His Excellency Aram J. Pothier, Governor, and the Honorable General Assembly of the State of Rhode Island and Providence Plantations, at its January Session,* 1911:

I have the honor to submit herewith Part Three of the Twenty-Third Annual Report of the Board of Managers of Rhode Island State College, as required by law.

CHARLES DEAN KIMBALL,

*President of the Board of Managers of Rhode Island State College.*

# Faculty and Other Officers.

---

HOWARD EDWARDS, A. M., LL. D.,

PRESIDENT,

*Professor of Political Economy and Social Science.*

HOMER JAY WHEELER, PH. D.,

*Professor of Geology.*

HARRIET LATHROP MERROW, A. M.,

*Professor of Botany and Secretary of the Faculty.*

VIRGIL LOUIS LEIGHTON, PH. D.,

*Professor of Chemistry.*

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*Professor of Mathematics.*

GEORGE EDWARD ADAMS, B. S.,

*Chief of Department of Agriculture and Professor of Agronomy.*

ANDREW EDWARD STENE, M. S.,

*Superintendent of College Extension.*

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First Lieutenant Sixth Infantry, United States Army,

*Professor of Military Science and Tactics.*

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*Professor of Home Economics.*

LEONARD PERLEY DICKINSON, B. S.,

*Professor of Physics and Electrical Engineering.*

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*Professor of English and Modern Languages.*

FRED S. PUTNEY, B. S.,

*Professor of Animal Husbandry.*

MARION LINCOLN CHAMBERLAIN, B. S.,

*Dean of Women and Librarian.*

WILLIAM SAWYER SPENCER, B. D.,

*Assistant Professor of Argumentation and Oral Expression.*

GEORGE ROBERT COBB, B. S.,

*Assistant Professor of Horticulture.*

THOMAS CARROLL RODMAN,

*Instructor in Woodwork.*

MABEL DEWITT ELDRED, B. S.,

*Instructor in Drawing.*

HOWLAND BURDICK, B. S.,

*Instructor in Dairying.*

DANIEL JOSEPH LAMBERT,

*Instructor Poultry Keeping.*

JOHN RALEIGH ELDRED, B. S.,

*Instructor in Mechanical Engineering.*

FRANCIS HERVEY SMITH, M. S.,

*Instructor in Chemistry.*

FLORENCE H. MYRICK, B. S.,

*Instructor in Languages.*

HERBERT SETON EAMES, B. S.,

*Instructor in Mechanical Engineering.*

ERNEST KINSEY THOMAS,

*Instructor in Nature Study and School Gardening, Extension Department.*

FRANK HARTWELL BILLS, B. S.,

*Instructor in Mathematics and Civil Engineering.*

PAUL CLOKE, E. E.,

*Instructor in Physics and Electrical Engineering.*

RUTH C. HADLEY, A. B.,

*Instructor in German.*

NELLIE ARMSTRONG HARRALL, B. S.,

*Instructor in Physical Training for Women.*

EMILE ARTHUR MALLETTE,

*Florist.*

LUCY COMINS TUCKER,

*Registrar and Secretary to the President.*

ALICE ELIZABETH BEALE,

*Bursar.*

JENNIE CRANDALL THOMPSON,

*Bookkeeper.*

# Lectures.

## Poultry Course.

E. W. Brown, Old Mystic, Conn., POULTRY INSTRUCTION.

George A. Cosgrove, Willington, Conn., A ONE MAN POULTRY FARM.

I. F. Dexter, Providence, R. I., MATING AND BREEDING LEGHORNS.

Samuel Knowles, Lexington, Mass., POULTRY KEEPING AS AN AVOCATION.

John H. Robinson, Boston, Mass., POULTRY HOUSES. FEEDING. BREEDING. Three lectures.

F. L. Sewell, Niles, Mich., STANDARD TYPES. Two lectures. Illustrated.

Henry D. Smith, Rockland, Mass., CAPONS AND CAPONIZING. Three lectures and a demonstration.

F. H. Stoneburn, Storrs, Conn., THE GOOD, BAD, AND INDIFFERENT ADVERTISED SYSTEMS OF POULTRY KEEPING.

E. Collins Tefft, Wakefield, R. I., POULTRY AND FRUIT CULTURE.

Carroll H. Magoon, Kingston, R. I., PLANS OF POULTRY FARMS. ESTIMATES OF INCOME. Two lectures.

## Farmers' Week.

H. W. Collingwood, New York, N. Y., THE CONSUMER'S DOLLAR.

J. W. Sanborn, Gilmanton, N. H., FARM ADMINISTRATION.

Wilfrid Wheeler, Concord, Mass., STRAWBERRY CULTURE.

# Experiment-Station Staff.

| | |
|---|---|
| Howard Edwards, M. A., LL. D. | President of the College.<br>*Ex-officio* Member. |
| H. J. Wheeler, Ph. D. | Director; Agronomy. |
| Burt L. Hartwell, Ph. D* | Chemistry. |
| George E. Adams, B. S. | Horticulture. |
| Philip B. Hadley, Ph. D. | Biology. |
| S. C. Damon, B. S. | Assistant, Agronomy. |
| Everett F. Southwick, B. Sc. | Assistant, Agronomy. |
| John I. Falconer, B. Sc. | Assistant, Agronomy. |
| John E. Seabright, B. A. | Assistant, Chemistry. |
| L. F. Whipple | Assistant, Chemistry. |
| Frederick S. Hammett, A. B. | Assistant, Chemistry. |
| Robert A. Lichtenthaeler, M. S. | Assistant, Chemistry. |
| F. R. Pember, M. S. | Assistant, Plant Physiology. |
| E. A. Mallette | Assistant, Floriculture. |
| Carroll H. Magoon | Assistant, Biology. |
| Elizabeth E. Amison, B. S. | Assistant, Biology. |
| Nathaniel Helme | Meteorology. |
| E. Elizabeth Meears | Librarian. |
| Edith L. Kennison, A. B. | Stenographer and Accountant. |
| Eleanor E. Gould | Stenographer. |

*The publications of the Station will be mailed free, upon request, to residents of Rhode Island. Suggestions as to how the station can aid the state are gladly received. Visitors are always welcome. Railway station, telegraph, express, and post-office—Kingston, Rhode Island. Long distance telephone, Narragansett Pier Exchange.*

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*In charge of experiments in plant physiology and animal feeding.

# College Calendar.

Wednesday, September 20....................Chapel Exercises, 8:20 A. M.
Registration, examination of entering and conditioned students, 9:00 A. M.
Thursday, September 21......................Recitations begin, 8:20 A. M.
Tuesday, November 7....................................Election Day.
Wednesday, November 29, 12:15 P. M. }
Monday, December 4, 8:20 A. M. } ..............Thanksgiving Recess.
Friday, December 22, 12:15 P. M. }
Wednesday, January 3, 1912, 8:20 A. M. } ...............Christmas Recess.
Friday, February 9, 4:35 P. M.............................First Term ends.
Tuesday, February 13....................Entrance Examination, 9:00 A. M.
Wednesday, February 14 ......................Second Term begins, 8:20 A. M.
Registration, 9:00 A. M. Recitations begin 1:00 P. M.
Sunday, February 11...........................Day of Prayer for Colleges.
Friday, April 5.............................................Good Friday.
Thursday, February 22 ............................Washington's Birthday.
Friday, May 10...............................................Arbor Day.
Thursday, May 30........................................Memorial Day.
Sunday, June 16.................................Baccalaureate Address.
Thursday, June 20 ............................Commencement Exercises.
Friday, June 21.........................Entrance Examination, 9:00 A. M.

# CALENDAR.

| | 1911. | | | | | | | | | | | | | | | | 1912. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | M | T | W | T | F | S | | S | M | T | W | T | F | S | | S | M | T | W | T | F | S |
| JAN. | .. | .. | .. | .. | .. | .. | .. | JULY. | .. | .. | .. | .. | .. | .. | 1 | JAN. | .. | 1 | 2 | 3 | 4 | 5 | 6 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| | 15 | 16 | 17 | 18 | 19 | 20 | 21 | | 16 | 17 | 18 | 19 | 20 | 21 | 22 | | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| | 22 | 23 | 24 | 25 | 26 | 27 | 28 | | 23 | 24 | 25 | 26 | 27 | 28 | 29 | | 28 | 29 | 30 | 31 | .. | .. | .. |
| | 29 | 30 | 31 | .. | .. | .. | .. | | 30 | 31 | .. | .. | .. | .. | .. | FEB. | .. | .. | .. | .. | 1 | 2 | 3 |
| FEB. | .. | .. | .. | 1 | 2 | 3 | 4 | AUG. | .. | .. | 1 | 2 | 3 | 4 | 5 | | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 11 | | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| | 12 | 13 | 14 | 15 | 16 | 17 | 18 | | 13 | 14 | 15 | 16 | 17 | 18 | 19 | | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| | 19 | 20 | 21 | 22 | 23 | 24 | 25 | | 20 | 21 | 22 | 23 | 24 | 25 | 26 | | 25 | 26 | 27 | 28 | 29 | .. | .. |
| | 26 | 27 | 28 | .. | .. | .. | .. | | 27 | 28 | 29 | 30 | 31 | .. | .. | MARCH. | .. | .. | .. | .. | .. | .. | .. |
| MARCH. | .. | .. | .. | 1 | 2 | 3 | 4 | SEPT. | .. | .. | .. | .. | .. | 1 | 2 | | .. | .. | .. | .. | .. | 1 | 2 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 11 | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | 12 | 13 | 14 | 15 | 16 | 17 | 18 | | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| | 19 | 20 | 21 | 22 | 23 | 24 | 25 | | 17 | 18 | 19 | 20 | 21 | 22 | 23 | | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 26 | 27 | 28 | 29 | 30 | 31 | .. | | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| | .. | .. | .. | .. | .. | .. | .. | | .. | .. | .. | .. | .. | .. | .. | | 31 | .. | .. | .. | .. | .. | .. |
| APRIL. | .. | .. | .. | .. | .. | .. | 1 | OCT. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | APRIL. | .. | 1 | 2 | 3 | 4 | 5 | 6 |
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| | 16 | 17 | 18 | 19 | 20 | 21 | 22 | | 22 | 23 | 24 | 25 | 26 | 27 | 28 | | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| | 23 | 24 | 25 | 26 | 27 | 28 | 29 | | 29 | 30 | 31 | .. | .. | .. | .. | | 28 | 29 | 30 | .. | .. | .. | .. |
| | 30 | .. | .. | .. | .. | .. | .. | NOV. | .. | .. | .. | 1 | 2 | 3 | 4 | MAY. | .. | .. | .. | 1 | 2 | 3 | 4 |
| MAY. | .. | 1 | 2 | 3 | 4 | 5 | 6 | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | 7 | 8 | 9 | 10 | 11 | 12 | 13 | | 12 | 13 | 14 | 15 | 16 | 17 | 18 | | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| | 14 | 15 | 16 | 17 | 18 | 19 | 20 | | 19 | 20 | 21 | 22 | 23 | 24 | 25 | | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | | 26 | 27 | 28 | 29 | 30 | .. | .. | | 26 | 27 | 28 | 29 | 30 | 31 | .. |
| | 28 | 29 | 30 | 31 | .. | .. | .. | DEC. | .. | .. | .. | .. | .. | 1 | 2 | JUNE. | .. | .. | .. | .. | .. | .. | 1 |
| JUNE. | .. | .. | .. | .. | 1 | 2 | 3 | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | | 17 | 18 | 19 | 20 | 21 | 22 | 23 | | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| | 25 | 26 | 27 | 28 | 29 | 30 | .. | | 31 | .. | .. | .. | .. | .. | .. | | 30 | .. | .. | .. | .. | .. | .. |

# RHODE ISLAND STATE COLLEGE.

## Foundation.

The college is one of the so-called land-grant colleges. Of the purpose of these institutions Senator Morrill, the author of the national legislation which brought them into existence in all the states, says:

"The fundamental idea was to offer an opportunity in every state for a liberal and larger education to larger numbers, not merely those destined to sedentary professions, but to those needing higher instruction for the world's business, for the industrial pursuits and professions of life." Again he says: "It was to give a chance to the industrial classes of the country to obtain a liberal education, something more than what was bestowed by our universities and colleges in general, which seemed to be based more on the English plan of giving education only to what might be called the professional classes, in law, medicine and theology."

The college has also a well-defined investigative purpose in its experiment station, organized as a department of the college and endowed by the general government.

The resources of the college are as follows:

(1) The interest on $50,000, which was the net amount received by the state from the sale of its scrip for 120,000 acres of land, granted by the general government in 1862. This fund came to the college in 1894.

(2) The annual appropriation of $15,000 from the general government, under what is known as the Hatch Act of 1887. This fund is exclusively for experimental purposes.

(3) The annual appropriation of $25,000 from the general government under the second Morrill Act of 1890. This fund is for teaching the subjects distinctly named and specified in the act, as follows: "to be applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural and economic science, with special

reference to their applications in the industries of life, and to the facilities for such instruction."

(4) The funds coming from the general government of the state under the Adams Act of 1906, yielding each year $15,000. This fund is exclusively for experimental purposes.

(5) The funds from the general government under the Nelson Amendment of 1907, amounting on July 1, 1907, to $5,000, and increasing yearly thereafter by $5,000 until the whole, in 1911, will amount to $25,000. This amendment is simply an extension of the 1890 Morrill grant and carries the same restrictions.

(6) The annual maintenance fund from the state, of $25,000, used for all the purposes for which the funds of the general government can not be used: *e. g.*, for extension work; for executive and administrative work; for heating, lighting and maintenance of buildings; for the teaching of modern languages other than English, of history and civics; for student labor, maintenance of grounds, roads, etc.

The college was founded in 1888 as an agricultural school. In 1892 it was incorporated as a college. The courses of study have been on a college basis since 1892; the requirements for a degree were raised in 1898; and the curriculum was again thoroughly revised during the years 1906–07 and 1907–08. The course in home economics for young women was introduced in 1908.

## Object and Organization.

The function of the Rhode Island State College is to aid in fostering the industrial life of the state, at least in so far as pertains to agriculture, manufactures, transportation, and home-making. This it does in three ways: 1. By the investigation and discovery of new truth more or less directly applicable in the industries. 2. By the direct distribution of industrial information to the people. 3. By the organization and adminstration of definite courses of instruction designed to fit young men and young women for effective work in the industrial pursuits.

The first of these duties is performed by the

## Experiment Station,

for a description of the work of which the reader is referred to the report of the director, constituting Part II of the Report of the Board of Managers for the current year. A statement of its staff organization may be found on page 9 of this catalogue.

The experiment station takes part, also, in the second phase of the college activities, by distributing its bulletins to all that desire and apply for them. In order, however, more fully and directly to bring the college and its work into touch with the people, a

## College Extension Department

has been organized, and is in active operation.

The purpose of this department is to carry the instruction of the college to those who cannot come to it for study. Whenever necessary and possible, visits will be made to any part of the state to examine farms, orchards, and gardens; to identify injurious insects or plant diseases, or give instruction in regard to methods of treatment; or to examine soils with a view to suggesting remedies for lack of fertility. General plans for laying out farms and for carrying out the details of any farm operation will be given the fullest consideration. The college is available for consultation at any time in regard to any problem of the farm, garden, or orchard. The fullest correspondence is invited, and conscientious consideration will be given to every letter received. In conjunction with this phase of the work popular bulletins are issued from time to time, which endeavor to present the gist of agricultural information on various topics without the uninteresting detail of the regular experiment-station bulletin.

Whenever possible, arrangements will be made for demonstrations or lectures by members of the college faculty and experiment-station staff when called for by any agricultural meeting or neighborhood gathering. A number of lectures on various subjects have been prepared, which can be secured on short notice by any gathering or organization within the state. These lectures are free, the only charge being the traveling expenses of the speaker. A complete list of the lectures, together with such other information in regard to them as may be of interest, has been prepared and may be obtained by sending a postal-card request to the department.

An important part of this extension work is to be the encouragement of home study and the conducting of correspondence courses. For the present, time and funds will not permit the carrying out of this plan, but advice will be given to any person wishing to take up home study regarding courses of reading, books, and other literature which may be necessary in connection with such work.

Under the direction of the state commissioner of public schools, books on agriculture, home economics, and related subjects, have been purchased, and, together with a selected list of bulletins and reports, have been made up into a traveling library to be sent out over the state. The demand for this library has been so great that Commissioner Ranger has recently purchased books for four more libraries, which are now ready for distribution. If these are not sufficient, books for additional libraries will be purchased as the demand increases.

The Extension Department aims to encourage nature study, school gardening, and elementary agriculture, and for this purpose maintains the following lines of extension work:

1. Nature Study.—This is encouraged through the publication of a little leaflet called the Nature Guard, and the organization of boys and girls in the schools and elsewhere into bands called Nature Guard bands, the purpose of which is to awaken in its members a livelier interest in the things of outdoor life. It endeavors to stimulate the powers of observation and lay the foundation for a simple, rational education which shall give the individual a love for nature and a sympathy with his environment and furnish him with a means of making life more useful and more enjoyable, whether lived in the country or in the city.

2. School Gardens.—The extension department endeavors to aid schools and organizations in carrying on children's gardens. An instructor is employed who gives a large part of his time to this work and who gives the children direct personal instruction in methods of preparing the ground, planting, cultivating, and harvesting garden crops.

Home gardens are also encouraged, and advice given through correspondence and by circulars about the best methods of cultivating garden crops. At the suggestion of the department, the Washington County Agricultural Society and the Newport County Agricultural Society will offer prizes for exhibits from children's gardens, and for seed and plant collections.

3. Elementary Agriculture.—As an aid to the introduction of elementary agriculture in the public schools, the department has undertaken to promote, in coöperation with various other educational and agricultural organizations in the state, a boys' corn growing contest. A premium list, for which the Board of Agriculture, the college, and a number of other organizations, business firms, and individuals, have provided prizes, has been issued, also a bulletin giving methods of growing and exhibiting corn. A state exhibition, for which the State Horticultural Society will provide space, will be held in the autumn. Granges, church organizations, Y. M. C. A.'s and schools have been asked to aid in forming boys' clubs, and in addition, where clubs cannot well be formed, individuals have been encouraged to take part in the contest.

Further notes in regard to this work are given in leaflets and circulars issued by the extension department, and correspondence from anyone who may be interested in regard to the same is invited.

## The College as an Educational Agency.

In its third form of activity, the purpose and work of the Rhode Island State College is to give college training and culture to young men and young women, not in spite of, but through and with vocational studies. Its courses are intended, first of all, to make the student a self-supporting unit in society, a positive force for social advancement, able and willing not only to maintain himself, but also to carry something of the common social burdens that always weigh upon the thoroughly efficient worker.

## I. THE FOUR-YEAR COURSES.

To this end certain college courses, intended to fit men and women for efficiency and leadership in well-defined life-activities, have been prepared. These courses are all founded upon training in mathematics, pure and applied; the English language as a means of intercommunication; and the sciences that deal with matter, force, and life as applied more directly to agriculture, the mechanic arts, and home economics. In the pursuit of these vocational studies, the effort is to accumulate an array of knowledge that, in the activities of industrial life, must be always practically serviceable, and, at the same time, to gain a disciplinary training both of brain and of muscle and nerve that make for practical effectiveness. These courses, moreover, recognizing that a college course should include not only intellectual training and the knowledge and skill requisite for bread-winning, but also preparation for citizenship, for moral and social life, have intertwined with the vocational work and study previously mentioned, the subjects that most directly make for culture and morality—history, economics, literature, languages, ethics, psychology, and sociology. These are ranked as of equal importance with the bread-winning studies.

The college courses just discussed are four years in length, and base themselves directly on the work of the four years of the high schools. They thus become an integral part of the school system of the state. Young men and young women, citizens of the state and having requisite high-school training, are admitted to these courses without charge for tuition.

The four-year courses thus offered are the agricultural course, the engineering course, the teachers' course in applied science, and the course in home economics.

## The Agricultural Course.

The agricultural course is intended to give thorough preparation for taking charge of and operating a piece of landed property. Its work is centered around instruction and practice in horticulture, general farming, and animal husbandry (more especially as applied to dairying and the poultry industry). The course consists of practical work combined with thorough study of the sciences bearing directly on such work, viz.: botany, chemistry, geology, zoölogy, anatomy, physics, and entomology. In addition, it embraces the culture and mental discipline arising from the study of mathematics, English composition and rhetoric, history, drawing, modern languages, economics, and English literature. The course is planned to give the student a full and rounded development as worker, as citizen, and as man.

All agricultural students will follow the same work in the first two years; but, at the beginnning of the Junior year, with the required work for all students in the course, three optional lines of work are offered, one of which must be selected by the student and followed until graduation. The three lines offered are agronomy, horticulture, and animal husbandry. No option and no subject will be given for which a number of students sufficient to warrant giving it has not applied. The tabulated course follows:

## Freshman Year.

| FIRST TERM. | CREDITS.* |
|---|---|
| Rhetoric and Composition (English I). | 3 |
| German or French (I or II) | 3 |
| Algebra (Math. I) Trigonometry (Math. II) | 5 |
| General Chemistry (Chem. I) | 2 [1½] |
| General Botany (Botany I) | 1 [2] |
| Propagation of Plants (Hort. I) | 1 [1] |
| Drawing, Pencil (Fr. Dr. II) | [1] |
| Drill (Mil. Sci. and T. I) | [1] |
| Theory (Mil. Sci. and T. II) | 1 |

| SECOND TERM. | CREDITS. |
|---|---|
| Rhetoric and Composition (English I). | 3 |
| German or French (I or II) | 3 |
| General Chemistry and Qualitative Analysis (Chem. II) | 3 [1½] |
| General Botany (Botany I) | 1 [2] |
| Stock Judging (An. Husb. I) | [2] |
| Breeds (An. Husb. III) | 2 |
| Poultry (An. Husb. XII) | [1] |
| Spraying and Pruning (Hort. IV) | 1 [1] |
| Drill (Mil. Sci. and T. I) | [1] |
| Theory (Mil. Sci. and T. II) | 1 |

## Sophomore Year.

| FIRST TERM. | CREDITS. |
|---|---|
| Newspaper Work (English II) | 1 |
| Interpretive Reading (Oral Expr. I) | 1 |
| German or French (II) | 3 |
| Qualitative Analysis (Chem. III) | [3] |
| Economic Botany (Botany II) | 1 [2] |
| General Zoölogy (Zoöl. I) | 2 [2] |
| Forage Plants (Agron. II) | 2 |
| Vegetable Gardening (Hort. II) | 2 |
| Surveying (Civ. Eng. I) | 1 [2] |
| Drill (Mil. Sci. and T. I) | [1] |

| SECOND TERM. | CREDITS. |
|---|---|
| Argumentation (English III) | 1 |
| Debating (Oral Expr. II) | 1 |
| German or French (II) | 3 |
| Organic Chemistry (Chem. IV) | 3 [1] |
| Descriptive Physics (Physics I) | 5 |
| Physiology (Zoöl. III) | 3 [1] |
| Geology (I) | 2 |
| Drill (Mil. Sci. and T. I) | [1] |

## Junior Year.

| FIRST TERM. | CREDITS. |
|---|---|
| Principles of Criticism (English IV) | 4 |
| Debating (Oral Expr. III) | 1 |
| Agricultural Chemistry (Chem. XIV) | 3 [1] |
| Soils and Fertilizers (Agron. III) | 4 [1½] |
| Dairy Practice (An. Husb. VII) | 1 [1½] |
| Fruit Culture (Hort. III) | 2 |
| Drill (Mil. Sci. and T. I) | [1] |

| SECOND TERM. | CREDITS. |
|---|---|
| Debating (Oral Expr. III) | 1 |
| Industrial History (History I) | 4 |
| Forestry (Botany IV) | 2 |
| Economic Entomology (Zoöl. IV) | 3 [1] |
| Farm Crops (Agron. IV) | 3 [1] |
| Farm Management (Agron. VII) | 2 |
| Farm Machinery (Agron. VI) | 2 [1] |
| Drill (Mil. Sci. and T. I) | [1] |

## Senior Year.

| FIRST TERM. | CREDITS. |
|---|---|
| Political Economy (Economics I), Civil Government (History II), Oratory (Oral Expr. IV) | 5 |
| Agric. Experimentation (Agron. X) | 3 |
| Plant Breeding (Agron. XI) | 3 |
| Feeding (An. Husb. VI) | 3 |
| Landscape Gardening (Hort. XIII) | 2 [1] |
| Elective | 5 |
| Drill (Mil. Sci. and T. I) | [1] |

| SECOND TERM. | CREDITS. |
|---|---|
| Civil Government (History II), Principles of Criticism—The Drama (English V), Oratory (Oral Expr. IV) | 5 |
| Breeding (An. Husb. IV) | 3 |
| Vet. Medicine (An. Husb. X) | 3 |
| Landscape Gardening (Hort. XIII) | 2 [1] |
| Elective | 8 |
| Drill (Mil. Sci. and T. I) | [1] |

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* A credit is given for one recitation per week; or for one exercise of two hours per week in laboratory, field, or shop. Credits for the latter are enclosed in brackets.

# The Engineering Course.

The engineering course has the same duration and the same general plan as the agricultural course. Students will follow the course as laid down until the second half of the Sophomore year, at which time they must elect one of the four optional lines offered, viz.: mechanical, electrical, civil, and chemical engineering. Any line of work for which the number of of applicants is insufficient to warrant giving it, the college reserves the right to withdraw.

The course is arranged to prepare young men for skilled and efficient work in the great manufacturing and commercial industries of the state; in the development of electricity as a motive force and in its thousand-fold other applications to the arts and to the life of society; in the activities of the new road-building era upon which we are entering; and in the applications of chemistry as now found in the great industrial establishments. At the same time, in this as in all other courses, it is not forgotten that the man in not a mere lever in his own machinery, and the effort after breadth and completeness of life is steadily maintained. The tabulated course follows:

## Freshman Year.

For the first year the course is the same for all students of engineering.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Rhetoric and Composition (English I)... | 3 | Rhetoric and Composition (English I)... | 3 |
| German or French (I or II)........... | 3 | German or French (I or II).......... | 3 |
| Algebra (Math. I), Trigonmetry (Math. II).................................. | 5 | Trigonometry, complete (Math. VII), Analytics (Math. VIII)............. | 5 |
| General Chemistry (Chem. I).......... | 2 [1½] | General Chemistry and Qualitative Analysis (Chem. II).................. | 3 [1½] |
| Mechanical Drawing (Mech. Eng. I).... | [3] | Mechanical Drawing (Mech. Eng. I).... | [2] |
| Forge and Foundry (Mech. Eng. II).... | [3] | Pattern Making (Mech. Eng. III)...... | [3] |
| Drill (Mil. Sci. and T. I).............. | [1] | Drill (Mil. Sci. and T. I).............. | [1] |
| Theory (Mil. Sci. and T. II).......... | 1 | Theory (Mil. Sci. and T. II).......... | 1 |

## MECHANICAL ENGINEERING.

## Sophomore Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Newspaper Work (English II)......... | 1 | Argumentation (English III).......... | 1 |
| Interpretive Reading (Oral Exper. I)... | 1 | Debating (Oral Expr. II)............. | 1 |
| Qualitative Analysis (Chem. III)....... | [3] | General Physics (Physics II).......... | 4 |
| General Physics (Physics II).......... | 4 | Laboratory (Physics III).............. | [1½] |
| Laboratory (Physics III).............. | [1½] | Calculus, completed (Math. XI)....... | 5 |
| Analytics, completed (Math. IX), Calculus (Math. X).................... | 5 | Graphic Statics (Mech. Eng. IV)....... | 2 |
| Descriptive Geometry (Mech. Eng. V).. | 1 [2] | Mechanical Drawing (Mech. Eng. VI).. | [3] |
| Surveying (Civ. Eng. I)............... | 1 [2] | Machine Shop (Mech. Eng. VII)....... | [3] |
| Drill (Mil. Sci. and T. I).............. | [1] | Drill (Mil. Sci. and T. I).............. | [1] |

## Junior Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Principles of Criticism (English IV) | 4 | Debating (Oral Expr. III) | 1 |
| Debating (Oral Expr. III) | 1 | Industrial History (History I) | 4 |
| Heat Engineering (Mech. Eng. IX) | 3 | Heat Engineering (Mech. Eng. IX) | 3 |
| Applied Mechanics (Mech. Eng. X) | 5 | Applied Mechanics (Mech. Eng. X), Hydraulics (Mech. Eng. XI) | 5 |
| Mechanism (Mech. Eng. XII) | 3 | Valve Gears (Mech. Eng. XIII) | 3 |
| Machine Shop (Mech. Eng. XIV) | [3] | Machine Shop (Mech. Eng. XIV) | [3] |
| Experimental Engineering a (Mech. Eng. XV) | [2] | Experimental Engineering b (Mech. Eng. XVI) | [2] |
| Drill (Mil. Sci. and T. I) | [1] | Drill (Mil. Sci. and T. I) | [1] |

## Senior Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Political Economy (Economics I), Civil Government (History II), Oratory (Oral Expr. IV) | 5 | Civil Government (History II), Principles of Criticism—The Drama, (English V), Oratory (Oral Expr. IV) | 5 |
| Experimental Engineering c (Mech. Eng. XVII) | 2 [2] | Experimental Engineering d (Mech. Eng. XVIII) | [2] |
| Machine Design (Mech. Eng. XX) | [3] | Machine Design (Mech. Eng. XX) | [3] |
| Power Plants and Design (Mech. Eng. XXI) | 2 [1] | Heating and Ventilation (Mech. Eng. XIX) | 1 |
| Assigned Work (Mech. Eng. XXII) | 3 | Assigned Work (Mech. Eng. XXII) | 3 |
| Theory of Direct Currents (El. Eng. I) | 3 | Theory of Alternating Currents (El. Eng. IV) | 2 |
| Drill (Mil. Sci. and T. I) | [1] | Drill (Mil. Sci. and T. I) | [1] |
| | | Dynamics of Machines (Mech. Eng. XXIII) | 2 |
| | | Works Management (Mech. Eng. XXIV) | 1 |
| | | Direct Current Laboratory(El. Eng. II). | [3] |

# ELECTRICAL ENGINEERING.

## Sophomore Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Newspaper Work (English II) | 1 | Argumentation (English III) | 1 |
| Interpretive Reading (Oral Expr. I) | 1 | Debating (Oral Expr. II) | 1 |
| Qualitative Analysis (Chem. III) | [3] | General Physics (Physics II) | 4 |
| General Physics (Physics II) | 4 | Laboratory (Physics III) | [1½] |
| Laboratory (Physics III) | [1½] | Calculus, completed (Math. XI) | 5 |
| Analytics, completed (Math. IX), Calculus (Math. X) | 5 | Graphic Statics (Mech. Eng. IV) | 2 |
| Descriptive Geometry (Mech. Eng. V) | 1 [2] | Mechanical Drawing (Mech. Eng. VI) | [3] |
| Surveying (Civ. Eng. I) | 1 [2] | Machine Shop (Mech. Eng. VII) | [3] |
| Drill (Mil. Sci. and T. I) | [1] | Drill (Mil. Sci. and T. I) | [1] |
| | | Electrical Measurements, (El. Eng. III). | [½] |

## Junior Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Principles of Criticism (English IV) | 4 | Debating (Oral Expr. III) | 1 |
| Debating (Oral Expr. III) | 1 | Industrial History (History I) | 4 |
| Theory of Direct Currents (El. Eng. I). | 3 | Direct-Current Laboratory (El. Eng. II). | [3] |
| Electrical Measurements (Physics IV) | 1 | Theory of Alternating Currents (El. Eng. IV) | 2 |
| Electrical Meas. Laboratory (Physics V). | [1½] | Steam Engineering (Mech. Eng. IX) | 3 |
| Steam Engineering (Mech. Eng. IX) | 3 | Applied Mechanics (Mech. Eng. X), Hydraulics (Mech. Eng. XI) | 5 |
| Applied Mechanics (Mech. Eng. X) | 5 | Experimental Engineering b (Mech. Eng. XVI) | [2] |
| Experimental Engineering a (Mech. Eng. XV) | [2] | Drill (Mil. Sci. and T. I) | [1] |
| Drill (Mil. Sci. and T. I) | [1] | | |
| Principles of Illumination (Phys. VI) | 1 [1½] | | |

### Senior Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Political Economy (Economics I.), Civil Government (History II), Oratory (Oral Expr. IV) | 5 | Civil Government (History II), Principles of Criticism—The Drama (English V), Oratory (Oral Expr. IV) | 5 |
| Theory of Alternating Currents (El. Eng. V) | 3 | Theory of Alternating Currents (El. Eng. V) | 3 |
| Alternating-Current Laboratory (El. Eng. VI) | [3] | Alternating Current Laboratory (El. Eng. VI) | [3] |
| Telephone Engineering (El. Eng. VIII) | 1 | Design of Electrical Machinery (El. Eng. VII) | [3] |
| Assigned Work (El. Eng. XII) | [3] | Electric-Railway Engineering (El. Eng. XI) | 2 |
| Experimental Engineering c (Mech. Eng. XVII) | 2 [2] | Assigned Work (El. Eng. XII) | [3] |
| Drill (Mil. Sci. and T. I) | [1] | Drill (Mil. Sci. and T. I) | [1] |
| Transmission of Energy (El. Eng. X) | 2 | | |
| Power Plants (Mech. Eng. XXI) | 2 | | |

## CIVIL ENGINEERING.

### Sophomore Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Newspaper Work (English II) | 1 | Argumentation (English III) | 1 |
| Interpretive Reading (Oral Expr. I) | 1 | Debating (Oral Expr. II) | 1 |
| Qualitative Analysis (Chem. III) | [3] | General Physics (Physics II) | 4 |
| General Physics (Physics II) | 4 | Laboratory (Physics III) | [1½] |
| Laboratory (Physics III) | [1½] | Calculus completed (Math. XI) | 5 |
| Analytics, completed (Math. IX), Calculus (Math. X) | 5 | Graphic Statics (Mech. Eng. IV) | 2 |
| Descriptive Geometry (Mech. Eng. V) | 1 [2] | Mechanical Drawing (Mech. Eng. VI) | [3] |
| Surveying (Civ. Eng. I) | 1 [2] | Machine Shop (Mech. Eng. VII) | [1½] |
| Drill (Mil. Sci. and T. I) | [1] | Topographic Surveying (Civ. Eng. II) | 1 [2] |
| | | Drill (Mil. Sci. and T. I) | [1] |

### Junior Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Principles of Criticism (English IV) | 4 | Debating (Oral Expr. III) | 1 |
| Debating (Oral Expr. III) | 1 | Industrial History (History I) | 4 |
| Graphic Statics. (Civ. Eng. IV) | 2 | Railroad Engineering (Civ. Eng. III b). | 3 |
| Steam Engineering (Mech. Eng. XXV). | 3 | Applied Mechanics (Mech. Eng. X), Hydraulics (Mech. Eng. XI) | 5 |
| Applied Mechanics (Mech. Eng. X) | 5 | Experimental Engineering b (Mech. Eng. XVI) | [2] |
| Railroad Engineering (Civ. Eng. III a) | 5 | Geology (I) | 2 |
| Drill (Mil. Sci. and T. I) | [1] | Roads and Pavements (Civ. Eng. V) | 3 [1] |
| | | Drill (Mil. Sci. and T. I) | [1] |

### Senior Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Political Economy (Economics I), Civil Government (History II), Oratory (Oral Expr. IV) | 5 | Civil Government (History II), Principles of Criticism—The Drama (English V), Oratory (Oral Expr. IV) | 5 |
| Experimental Engineering c (Mech. Eng. XVII) | 2 [2] | Experimental Enginering d (Mech. Eng. XVIII) | [2] |
| Bridge Details (Civ. Eng. VI) | [2] | Bridge Design (Civ. Eng. VIII) | [3] |
| Bridge Analysis (Civ. Eng. VII) | 2 | Reinforced Concrete (Civ. Eng. X) | 2 |
| Masonry Construction (Civ. Eng. IX) | 2 [1] | Water Supply (Civ. Eng. XII) | 3 |
| Sewerage (Civ. Eng. XI) | 2 | Tunneling (Civ. Eng. XIII) | 1 |
| Assigned Work (Civ. Eng. XV) | 3 | Contracts and Specifications (Civ. Eng. XIV) | 2 |
| Drill (Mil. Sci. and T. I) | [1] | Assigned Work (Civ. Eng. XV) | 3 |
| | | Drill (Mil. Sci. and T. I) | [1] |

## CHEMICAL ENGINEERING.

### Sophomore Year.

| First Term. | Credits. |
|---|---|
| Newspaper Work (English II) | 1 |
| Interpretive Reading (Oral Expr. I) | 1 |
| Qualitative Analysis (Chem. III) | [3] |
| General Physics (Physics II) | 4 |
| Laboratory (Physics III) | [1½] |
| Analytics, completed (Math. IX), Calculus (Math. X) | 5 |
| Descriptive Geometry (Mech. Eng. V) | 1 [2] |
| German (Ger. II) | 3 |
| Drill (Mil. Sci. and T. I) | [1] |

| Second Term. | Credits. |
|---|---|
| Argumentation (English III) | 1 |
| Debating (Oral Expr. II) | 1 |
| General Physics (Physics II) | [1½] |
| Laboratory Physics (Physics III) | 4 |
| Calculus, completed (Math. XI) | 5 |
| Graphic Statics (Mech. Eng. IV) | 2 |
| Organic Chemistry (Chem. IV) | 3 [1] |
| Quantitative Analysis (Chem. VII) | [3] |
| German (Ger. II) | 3 |
| Drill (Mil. Sci. and T. I) | [1] |

### Junior Year.

| First Term. | Credits. |
|---|---|
| Principles of Criticism (English IV) | 4 |
| Debating (Oral Expr. III) | 1 |
| Steam Engineering (Mech. Eng. IX) | 3 |
| Applied Mechanics (Mech. Eng. X) | 5 |
| Quantitative Analysis (Chem. VIII) | [3] |
| Physical Chemistry (Chem. XII) | 3 [1] |
| Reports and Discussions (Chem. XXI) | 1 |
| Drill (Mil. Sci. and T. I) | [1] |

| Second Term. | Credits. |
|---|---|
| Debating (Oral Expr. III) | 1 |
| Industrial History (History I) | 4 |
| Steam Engineering (Mech. Eng. IX) | 1½ |
| Organic Chemistry (Chem. VI.) | [3] |
| Quantitative Analysis (Chem. VIII) | [4½] |
| Determinative Mineralogy (Chem. XI) | [1½] |
| Industrial Chemistry (Chem. XVI) | 4 |
| Reports and Discussion (Chem. XXI) | 1 |
| Drill (Mil. Sci. and T. I) | [1] |

### Senior Year.

| First Term. | Credits. |
|---|---|
| Political Economy (Economics I), Civil Government (History II), Oratory (Oral Expr. IV) | 5 |
| Mechanism (Mech. Eng. XII) | 3 |
| Experimental Engineering a (Mech. Eng. XV) | [2] |
| Theory of Direct Currents (El. Eng. I) | 3 |
| Organic Chemistry (Chem. V) | 3 [1] |
| Reports and Discussions (Chem. XXI) | 1 |
| Assigned Work (Chem. XX) | 3 |
| Drill (Mil. Sci. and T. I) | [1] |

| Second Term. | Credits. |
|---|---|
| Civil Government (History II), Principles of Criticism—The Drama (English V), Oratory (Oral Expr. IV) | 5 |
| Metallurgy (Chem. XIII) | 2 |
| Industrial Chemistry (Chem. XVII) | [3] |
| Assaying (Chem. XVIII) | [2] |
| Reports and Discussions (Chem. XXI) | 1 |
| Assigned Work (Chem. XX) | 3 |
| Electro-Chemistry (Chem. XXII) | 3 |
| Drill (Mil. Sci. and T. I) | [1] |

## Teachers' Courses in Applied Science.

This course is intended to prepare persons to teach in industrial schools those branches of applied science that pertain especially to agriculture and the mechanic arts. In such schools it has been found of especial importance that the teachers be trained in an environment of current thought, sympathetic with the industrial applications of science and intelligently appreciative of the methods and problems of such work. In response, therefore, to the need, and in accordance with an expressed purpose of the new fund from the United States Government, we have constructed this course. The effort has been to make the course effective for its purpose, while at the same time retaining for it that breadth and that cultural influence that are necessary to fit the whole man or woman for social life and are especially important in persons who, as teachers, will exercise large personal influence over immature youth.

The general plan of the course is the same as that of the other two courses just described. It opens to the student, at the beginning of the Junior year, three options, one of which he must select in conjunction with certain studies required of all. The tabulated course follows:

## Freshman Year.

| FIRST TERM. | CREDITS. |
|---|---|
| Rhetoric and Composition (English I)... | 3 |
| German or French (I or II) | 3 |
| Algebra (Math. I), Trigonometry (Math. II) | 5 |
| General Chemistry (Chem. I) | 2 [1½] |
| General Botany (Botany I) | 1 [2] |
| Propagation of Plants (Hort. I) | 1 [1] |
| Drawings, Pencil (Fr. Dr. II) | [1] |
| Drill (Mil. Sci. and T. I), and Theory (Mil. Sci. and T. II) | 1 [1] |
| or | |
| Hygiene (Home Econ. III a) and Physical Training | 1 [1] |

| SECOND TERM. | CREDITS. |
|---|---|
| Rhetoric and Composition (English I). | 3 |
| German or French (I or II) | 3 |
| General Chemistry and Qualitative Analysis (Chem. II) | 3 [1½] |
| General Botany (Botany I) | 1 [2] |
| Trigonometry, completed (Math. VII), Analytics (Math. VIII) | 5 |
| Drawing ,Pencil (Fr. Dr. II) | [1] |
| Drill (Mil. Sci. and T. I), and Theory (Mil. Sci. and T. II)] | 1 [1] |
| or | |
| Euthenics (Home Econ. III b) and sical Training | 1 [1] |

## Sophomore Year.

| FIRST TERM. | CREDITS. |
|---|---|
| Newspaper Work (English II) | 1 |
| Interpretive Reading (Oral Expr. I) | 1 |
| German or French (II) | 3 |
| Qualitative Analysis (Chem. III) | [3] |
| Economic Botany (Botany II) | 1 [2] |
| General Zoölogy (Zoöl. I) | 2 [2] |
| General Physics (Physics II) | 4 |
| Laboratory (Physics III) | [1½] |
| Drill (Mil. Sci. and T. I) or Physical Training | [1] |

| SECOND TERM. | CREDITS. |
|---|---|
| Argumentation (English III) | 1 |
| Debating (Oral Expr. II) | 1 |
| German or French (II) | 3 |
| Organic Chemistry (Chem. IV) | 3 [1] |
| Physiology (Zoöl. III) | 3 [1] |
| Geology (I) | [2] |
| General Physics (Physics II) | 4 |
| Laboratory (Physics III) | [1½] |
| Drill (Mil. Sci. and T. I) or Physical Training | [1 |

## Junior Year.

| FIRST TERM. | CREDITS. |
|---|---|
| Principles of Criticism (English IV) ... | 4 |
| Debating (Oral Expr. III) | 1 |
| Psychology (Psy. and Ed. IV) | 3 |
| Drill (Mil. Sci. and T. I) or Physical Training | [1] |
| Elective | 5 |
| Options: A, B, C. All of the subjects in one of the following groups must be choosen: | |
| *A. Agriculture.* | |
| Soils (Agron. III) | 4 [1½] |
| Veg. Gardening (Hort. II) or Fruit Culture (Hort. III) | 2 |
| *B. Biology.* | |
| Vertebrate Anatomy (Zoöl. VII) | 1 [2] |
| Plant Histology (Botany V | 1 [4] |
| *C. Chemistry.* | |
| Quantitative Analysis (Chem. VIII) | [3] |
| Organic Chemistry (Chem. V) | 3 [1] |
| Reports and Discussions (Chem. XXI).. | 1 |

| SECOND TERM. | CREDITS. |
|---|---|
| Debating (Oral Expr. III) | 1 |
| Industrial History (History I) | 4 |
| Drill (Mil. Sci. and T. I) or Physical Training | [1] |
| Elective | 5 |
| Options: A, B, C. All of the subjects in one of the following groups must be chosen: | |
| *A. Agriculture.* | |
| Farm Crops (Agron. IV) | 3 [1] |
| Economic Entomology (Zoöl. IV) | 3 [1] |
| Forestry (Botany IV) | 2 |
| *B. Biology.* | |
| Histology and Embryology (Zoöl. VIII). | 2 [3] |
| Plant Pathology (Botany VI) | 1 [4] |
| *C. Chemistry.* | |
| Organic Chemistry (Chem. VI) | [3] |
| Quantitative Analysis (Chem. VIII) | [4½] |
| Mineralogy (Chem. XI) | [1½] |
| Reports and Discussions (Chem. XXI). | 1 |

## Senior Year.

| First Term. | Credits. |
|---|---|
| Political Economy (Economics I), Civil Government (History II), Oratory (Oral Expression IV) | 5 |
| History of Education (Psy. and Ed. I) | 3 |
| Principles of Education (Psy. and Ed. II) | 2 |
| Assigned Work | 3 |
| Drill (Mil. Sci. and T. I) or Physical Training | [1] |
| Options: A, B, C. | |
| All of the subjects in one of the following groups must be chosen: | |
| *A. Agriculture.* | |
| Poultry (An. Husb. XII) | [1] |
| Landscape Gardening (Hort. XIII) | 2 [1] |
| Feeding (An. Husb. VI) | 3 |
| *B. Biology.* | |
| Plant Breeding (Agron XI) | 3 |
| Trees and Shrubs (Botany III) | [1] |
| Entomology (Zoöl. V) | 1 [2] |
| *C. Chemistry.* | |
| Physical Chemistry (Chem. XII) | 3 [1] |
| Reports and Discussions (Chem. XXI) | 1 |

| Second Term. | Credits. |
|---|---|
| Civil Government (History II), Principles of Criticism—The Drama (English V), Oratory (Oral Expression IV) | 5 |
| Secondary Education (Psy. and Ed. III) | 2 |
| Assigned Work | 3 |
| Drill (Mil Sci. and T. I) or Physical Training | [1] |
| Options: A, B, C. | |
| All of the subjects in one of the following groups must be chosen: | |
| *A. Agriculture.* | |
| Landscape Gardening (Hort. XIII) | 2 [1] |
| Floriculture (Hort. VI) | 1 [1] |
| Farm Buildings (An. Husb. XI) | [1] |
| Breeding (An. Husb. IV) | 3 |
| *B. Biology.* | |
| General Zoölogy (Zoöl. II) | 1 [2] |
| Entomology (Zoöl. V) | 2 [2] |
| Trees and Shrubs (Botany III) | [1] |
| *C. Chemistry.* | |
| Electro-Chemistry (Chem. XXII) | 3 |
| Industrial Chemistry (Chem. XVI) | 4 |
| Industrial Chemistry (Chem. XVII) | [3] |
| Reports and Discussions (Chem. XXI) | 1 |

## The Course in Home Economics.

The object of the home economics course is to fit young women for homemaking and to provide adequate training for teachers of the various household arts. Nowhere is the application of modern science to everyday life more important than in the home. In no other lifework do women find greater need of scientific knowledge and technical skill than in the intelligent and economic administration of household affairs.

The course includes instruction in the planning, sanitation, decoration, and care of the house and its administration on the economic side; the preparation of food from the scientific and economic points of view; the study of nutrition; the discussion of problems of personal and public hygiene and instruction in the care of infants and young children. During one year instruction is given in hand sewing, machine practice, and in drafting, cutting, and making of plain garments. Although the main work is scientific and technical, the importance of artistic and literary training for home life has not been neglected. It is recognized that all the knowledge of right living is needed to assist the student to a broader conception of citizenship as well as in performing the manifold duties of daily life.

Attention has also been given, in planning the course, to the needs of students desiring to enter special fields of domestic activity along institutional and educational lines of work.

The entrance requirements are the same as for the other college courses. Of the one hundred and seventy credits required for graduation, thirty-seven are required in the home economics department. Students are expected to take the course as outlined below, with choice of electives; but when entered in other courses in the college they may elect certain work in the home economics department, under direction of the head of the department. The tabulated course follows:

## Freshman Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Rhetoric and Composition (English I) | 3 | Rhetoric and Composition (English I) | 3 |
| German or French (I or II) | 3 | German or French (I or II) | 3 |
| Algebra (Math. I), Trigonometry (Math. II) | 5 | General Chemistry and Qualitative Analysis (Chem. II) | 3 [1½] |
| General Chemistry (Chem. I) | 2 [1½] | General Botany (Botany I) | 1 [2] |
| General Botany (BotanyI) | 1 [2] | Drawing, Pencil (Fr. Dr. II) | [1] |
| Drawing, Pencil (Fr. Dr. II) | [1] | Physical Training | [1[ |
| Physical Training | [1] | Domestic Art (H. Ec. I) | [2] |
| Domestic Art (H. Ec. I) | [1] | Elementary Cookery (H. Ec. II) | 1 [1] |
| Hygiene (H. Ec. IIIa) | 1 | Euthenics (H. Ec. IIIb) | 1 |

## Sophomore Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Newspaper Work (English II) | 1 | Argumentation (English III) | 1 |
| Interpretive Reading (Oral Expr. I) | 1 | Debating (Oral Expr. II) | 1 |
| German or French (II) | 3 | German or French (II) | 3 |
| Qualitative Analysis (Chem. III) | [3] | Organic Chemistry (Chem. IV) | 3 [1] |
| General Zoölogy (Zoöl. I) | 2 [2] | Physiology (Zoöl. III) | 3 [1] |
| Color problems (Fr. Dr. IV) | [1] | Descriptive Physics (Physics I) | 5 |
| Physical Training | [1] | Physical Training | [1] |
| Foods (H. Ec. IV) | 3 [1½] | Foods (H. Ec. IV) | 2 [1½] |
| Household Management (H. Ec. V) | 2 | | |

## Junior Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Principles of Criticism (English IV) | 4 | Debating (Oral Expr. III) | 1 |
| Debating (Oral Expr. III) | 1 | Industrial History (Histroy I) | 4 |
| Psychology (Psy. and Ed. IV) | 3 | Physical Training | [1] |
| Physical Training | [1] | Physiological Chemistry (Chem. XIX) | 4 |
| Vertebrate Anatomy (Zoöl. VII) | 1 [2] | Histology and Embryology (Zoöl. VIII) | 2 [3] |
| Mechanical Drawing (Mech. Eng. II) | [1½] | History of Art (Fr. Dr. III) | 2 |
| Human Nutrition (H. Ec. VI) | 3 | Freehand Drawing (VIII) | [1] |
| Home Decoration (H. Ec. VII) | 2 | Dietetics (H. Ec. VIII) | 1 [1] |
| Elective | 4 | Sanitation (H. Ec. IX) | 2 |
| | | Elective | 3 |

## Senior Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Political Economy (Economics I), Civil Government (History II), Oratory (Oral Expr. IV) | 5 | Civil Government (History II), Principles of Criticism—The Drama (English V), Oratory (Oral Expr. IV) | 5 |
| Physical Training | [1] | Sociology (Psy. and Ed. VII) | 3 |
| Food Analysis (Chem. X) | [4] | Physical Training | [1] |
| History of Education (Psy. and Ed. I) | 3 | Assigned Work (H. Ec. XIV) | 3 [2] |
| History of Art (Fr. Dr. III) | 2 | Home Nursing (H. Ec. XII) | 2 |
| Food Preservation (H. Ec. X) | 1 | Therapeutic Cookery (H. Ec. XIII) | 1 [1] |
| Hygiene and Care of Children (H. Ec. XI) | 2 | Elective | 3 |
| Elective | 3 | | |

## II. SHORT COURSES IN AGRICULTURE, IN MECHANIC ARTS, AND IN DOMESTIC SCIENCE.

To meet the needs of those who find it inexpedient to undertake a four-years' college course, but who, nevertheless, desire to increase their efficiency on the farm, in the home or in industrial pursuits, the college offers what are known as short courses in agriculture, in mechanic arts, and in domestic science.

At present each of these courses is of two years' duration. The only requirements for admission are that candidates shall be at least eighteen years of age and shall have completed the common school course. The courses are in no case supposed to serve as a substitute for the regular work of the college, in character or scope of the subject-matter presented, and do not lead, directly or indirectly, to a degree, a certificate only being granted. Neither are they to be considered as preparatory to the college work. Their particular function is to give, in the shortest, most direct way possible, certain definite, specific, and perhaps uncorrelated information which will be of immediate value on the farm, in the shop, or in the home.

In studies of common interest, like mathematics and English, all short-course students work together. All other instruction is of a special nature and is given in the respective departments of agriculture, mechanical engineering, and home economics. In mathematics work is begun in arithmetic, covers mensuration, gives an elementary treatment of bookkeeping, and proceeds with work of a more advanced character as far as the capabilities of the class will permit. The greatest stress is laid upon the analysis and solution of many practical problems from the farm, the factory, and from daily life. In English the object is to develop the power of clear analysis and expression by continued drill in grammar and composition, based upon readings in industrial or political history.

The special work in agriculture treats in an elementary way of such subjects as plant life, soils and fertilizers, vegetable gardening, stock judging, crops, dairy practice, poultry, fruit culture, etc. The course in domestic science gives practical instruction in the care of the house, foods, plant life, physical training, home management, etc. The engineering department offers work in the various forms of shop work, draughting, mechanical movements, and practical information in regard to the construction and operation of engines. boilers, and pumps.

Short-course work is of comparatively recent introduction at this institution, and consequently is still in the process of development. It is hoped to increase the effectiveness of each of the above phases of the work at as early a date as possible, by more completely separating them from one another and from other lines of instruction; also, particularly in agriculture and engineering, by a re-adjustment of the time in such a way as to accommodate a greater number of men desiring to take the course. For example, it is proposed to give the agricultural matter in three winter terms of twenty-four weeks each, rather than in two years of thirty-six weeks each, the idea being that the shorter period would enable a larger number of practical farmers to attend. In engineering the problem is somewhat different. Its proposed solution is as follows:—Demands for definite, special training, as for a dynamo tender or a stationary engineer, may be met by making the courses of instruction largely special or elective. In order that irregular periods of freedom from regular duties may be employed for study, and that each individual's progress may depend only on his own exertions and ability, it is proposed to conduct this department as an ungraded school. This plan should possess the attractions and possibilities of the usual correspondence courses, and be far superior to them in the opportunities for personal instruction and laboratory practice. According to this arrangement, a student might enter at any time and take any one or group of the following subjects: English grammar, and composition based on the technical work; arithmetic and mensuration; mechanical drawing; forge shop; pattern making; machine shop; mechanical movements; elementary discussion of power-plant machinery; elementary electricity; electrical wiring. The tabulated courses follow:

## Agriculture.

### First Year.

| First Term. | Credits. | Second Term. | Credits. |
|---|---|---|---|
| Elementary English (A) | 5 | Elementary English (A) | 5 |
| Plant Life (Botany A) | 1 [2] | Plant Life (Botany A) | 1 [2] |
| Elementary Zoölogy (A) | 3 [1½] | Soils, Fertilizers (Agron. A) | 4 [1] |
| Breeds (An. Husb. A) | 2 | Plant and Animal (Chem. A) | 3 [1] |
| Stock Judging (An. Husb. B) | [2] | Nursery Practice (Hort. C) | 1 [1] |
| Plant and Animal (Chem. A) | 3 [1] | Benchwork (Woodwork I) | [1½] |
| Drill (Mil. Sci. and T. I) | [1] | Drill (Mil. Sci. and T. I) | [1] |

## Second Year.

| FIRST TERM. | CREDITS. | SECOND TERM. | CREDITS. |
|---|---|---|---|
| Bookkeeping (Math. G) | 4 | Vegetable Gardening (Hort. A) | 2 [1] |
| Crops and Rotation (Agron. B) | 3 [1] | Farm Management (Agron. C | 4 |
| Dairy Practice (An. Husb. C) | 1 [2] | Breeding (An. Husb. E) | 2 [1] |
| Stock Feeding (An. Husb. D) | 3 | Poultry (An. Husb. F.) | 1 [1] |
| Fruit Culture (Hort. B) | 3 | Farm Buildingss (Wood work H) | [2] |
| Poultry (An. Husb. F) | 1 [1] | Farm Machinery (Agron. D) | 1 [2] |
| Care of Farm Animals (An. Husb. G) | 2 | Spraying and Pruning (Hort. E) | 1 [1] |
| Drill (Mil. Sci. and T. I.) | [1] | Home Grounds (Hort. F) | [1] |
|  |  | Drill (Mil. Sci. and T. I) | [1] |

# Mechanic Arts.

## First Year.

| FIRST TERM. | CREDITS. | SECOND TERM. | CREDITS. |
|---|---|---|---|
| Elementary English (A) | 5 | Elementary English (A) | 5 |
| Arithmetic (Math. F) | 5 | Arithmetic (Math. F) | 5 |
| Mechanical Drawing (Mech. Eng. I) | [3] | Mechanical Drawing (Mech. Eng. I) | [3] |
| Forge and Foundry (Mech. Eng. II) | [3] | Pattern Making (Mech. Eng. III) | [3] |
| Machine Shop (Mech. Eng. VII) | [3] | Machine Shop (Mech. Eng. VII) | [3] |
| Mechanical Movements (Mech. Eng. D). | 3 | Mechanical Movements (Mech. Eng. D). | 3 |
| Drill (Mil. Sci. and T. I) | [1] | Drill (Mil. Sci. and T. I) | [1] |

## Second Year.

| FIRST TERM. | CREDITS. | SECOND TERM. | CREDITS. |
|---|---|---|---|
| Elementary English (B) | 3 | Elementary English (B) | 3 |
| Bookkeeping (Math. G) | 4 | Algebra (Math. H) | 5 |
| Mechanical Drawing (Mech. Eng. VI) | [3] | Mechanical Drawing (Mech. Eng. VI) | [3] |
| Machine Shop (Mech. Eng. XIV) | [3] | Machine Shop (Mech. Eng. XIV) | [3] |
| Engineering Theory (Mech. Eng. E) | 5 | Engineering Theory (Mech. Eng. E) | 5 |
| Elementary Physics (A) | 3 | Elementary Physics (A) | 3 |
| Drill (Mil. Sci. and T. I) | [1] | Drill (Mil. Sci. and T. I) | [1] |

# Domestic Science.

## First Year.

| FIRST TERM. | CREDITS. | SECOND TERM. | CREDITS. |
|---|---|---|---|
| Elementary English (A) | 5 | Elementary English (A) | 5 |
| Arithmetic (Math. F) | 5 | Arithmetic (Math. F.) | 5 |
| Plant Life (Botany A) | 1 [2] | Plant Life (Botany A.) | 1 [2] |
| Elementary Zoölogy (A) | 2 [2½] | Floriculture | [2] |
| Household Technique (Dom. Sci. A) | [1] | Foods (Dom. Sci. C) | 3 [1½] |
| Sewing (Dom. Sci. B) | [1] | Physical Training | [1] |
| Physical Training | [1] |  |  |

## Second Year.

| FIRST TERM. | CREDITS. | SECOND TERM. | CREDITS. |
|---|---|---|---|
| Elementary English (B) | 3 | Elementary English (B) | 3 |
| Bookkeeping (Math. G.) | 4 | Algebra (Math. H) | 5 |
| Plant and Animal (Chem. A) | 3 [1] | Plant and Animal (Chem. A) | 3 [1] |
| English History (History A) | 3 | English History (History A) | 3 |
| Dietetics (Dom. Sci. D) | 3 [1] | Management of House (Dom. Sci. E) | 1 |
| Physical Training | [1] | Hygiene (Dom. Sci. F) | 1 |
|  |  | Textiles (Dom. Sci. G) | [1½] |
|  |  | Physical Training | [1] |

## III. SPECIAL POULTRY COURSE.

For many years this college has offered a winter course in the poultry industry. In fact, the first poultry course to be offered in the United States was offered here thirteen years ago. The college will continue to offer a course during the winter term.

## Requirements for Admission to the Degree Courses.

### UNITS.

The requirements for admission are reckoned in units. A "unit" represents the successful completion of a year's study of a subject, to which have been devoted not less than one hundred and twenty recitation periods of sixty minutes each, or their equivalent (*e. g.*, one hundred and eighty periods of forty minutes each). For the year 1911–12, fourteen units will be required. A student may obtain this amount of entrance credit from high-school work or from examination.

### GROUPS.

The entrance subjects are divided into two groups, A. and B. Those in A, with one exception—solid geometry—are required of all candidates for admission.

### Group A.

The school year is reckoned at thirty-six weeks, the minimum length.

| | | |
|---|---|---|
| English | 108 weeks | 3 units. |
| German or French | 36 weeks | 1 units. |
| Algebra | 54 weeks | 1½ units. |
| Geometry, Plane | 36 weeks | 1 unit. |
| Geometry, Solid—for engineering students only, | 18 weeks | ½ unit. |
| Physics | 36 weeks | 1 unit. |
| History | 36 weeks | 1 unit. |

The remainder of the fourteen units must be taken from

### Group B.*

No subject is accepted for more than the amount here stated or for less than two-fifths of a unit.

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* Other subjects not here named will receive due consideration if presented on the application blank, with a statement of the work done.

| | | |
|---|---|---|
| Foreign Language | 216 weeks | 6 units. |
| Geometry, Solid—for other than engineering students, | 18 weeks | ½ unit. |
| Botany | 36 weeks | 1 unit. |
| Chemistry | 36 weeks | 1 unit. |
| Geology | 18 weeks | ½ unit. |
| Physiography | 36 weeks | 1 unit. |
| Physiology | 18 weeks | ½ unit. |
| Zoölogy | 36 weeks | 1 unit. |
| History | 36 weeks | 1 unit. |
| Drawing | 36 weeks | 1 unit. |
| Domestic Science | 18 weeks | ½ unit. |
| Shop Practice | 18 weeks | ½ unit. |
| Farm Practice | 18 weeks | ½ unit. |

## METHODS OF ADMISSION.

On any or all of the subjects named in both groups, satisfactory standings from any reputable high school will be accepted in lieu of examination, on presentation of a copy of the student's full record in the high school, showing clearly the nature of the work pursued in each subject, time devoted to it, and grade of work done. This copy must be duly signed by the proper official of the school, and must be accompanied by a certificate of good moral characer. The latter, however, may be from any reputable source. On application, blanks showing definitely the full nature of the information desired from the high school will be furnished.

Candidates not presenting satisfactory standings from reputable high schools will be examined, over ground corresponding to the number of points attached on all the subjects of Group A and on such of Group B as they may offer. Examinations for entrance will be held at the close of the college year in June, and also at the opening in September, as announced in the calendar, page 11.

## SPECIFICATIONS OF GROUND TO BE COVERED.*

### GROUP A.

These subjects, with the exception stated, are required of all students to the extent indicated by the number of units designated in each case.

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* For any or all of the subjects described below the requirements of the College Entrance Examination Board, upon which these specifications are largely based, will be accepted. A circular stating these requirements in detail and blank forms of application for examination may be obtained by sending ten cents in stamps to the College Entrance Examination Board, Post Office Sub-Station 84, New York City.

## Languages.

English, 3 units—In English two aims are sought: first, a knowledge of the language—including the acquisition of an ample vocabulary and power of effective expression—second, some acquaintance with the literature. To attain the first, grammar and composition must be thoroughly studied. Throughout the secondary-school course there should be much practice in writing along a variety of lines suggested by the pupil's experience, his general interests, and studies other than English. Spelling, punctuation, accuracy of idiom, should receive due attention in all written work; while correct and forceful oral expression should also be insisted upon.

To meet the requirement in literature certain selections are to be made from two lists of works—one for reading, the other for closer study. It is hoped to foster in this way a taste for good books and an intelligent appreciation of them. Committing to memory selected passages and reading aloud are strongly urged. In all cases some knowledge of the author's life and his place in literature should be acquired, while a more exacting study of selected texts would lay emphasis on form and style, meaning of particular words and phrases, and the significance of allusions. The list of books prescribed for 1911–12 will be sent on application, or may be obtained from the nearest high-school principal.

German, 1 unit.—During the first year the work should consist of drill in pronunciation, the rudiments of grammar, writing from dictation, simple composition and conversation, and the reading of from 100 to 175 pages of easy prose and poetry.

French, 1 unit.—The course in French should parallel that in German. During the first year there should be drill in pronunciation, the rudiments of grammar, writing from dictation, simple composition and conversation, and the reading of from 100 to 175 pages of easy prose and poetry.

## Mathematics.

Algebra, 1½ units.—The requirement in algebra comprises the four fundamental operations; factoring, highest common factor and lowest common multiple; fractions; linear equations; exponents; radicals; quadratic equations; simultaneous equations involving quadratics; binomial theorem for positive integral exponents. Problems should be given at frequent intervals in the work.

Plane Geometry, 1 unit.—This requirement is met by the usual theorems and constructions of standard text-books, numerous originals, and applications.

Solid Geometry, ½ unit.—The ground is covered by the usual theorems and constructions of standard text-books, originals, and applications.

## Science.

Physics, 1 unit.—This course should consist of classroom work based on a standard text-book, accompanied by lecture-table demonstrations and by numerous practical problems. A parallel course in individual laboratory work is desirable, but is not absolutely required. In the case of laboratory work, one hour of credit will be allowed for each two hours spent in the laboratory.

### History, 1 unit.

The requirement in history will be met by presenting any one of the following subjects: ancient history, especially Greek and Roman, with the chief events of the early Middle Ages to the death of Charlemagne (814); medieval and modern European history from 814 to the present time; English history; American history and civil government.

## GROUP B.

From this group units are to be taken, in addition to those of Group A, sufficient to make up the whole number required. Any combination of units, including fractions not less than two-fifths, will be allowed.

### Languages.

GERMAN, 2 OR 3 UNITS.—The requirement for one unit is indicated under Group A. One unit will also be allowed for second and each for third and fourth year work. During the second year the course should be a continuation of the first as regards grammar, composition, and conversation. The reading should consist of at least 200 pages of such texts as Arnold's *Fritz auf Ferien*, Wildenbruch's *Das Edle Blut*, Mosher's *Willkommen in Deutschland* and Benedix' *Der Prozess*. Third-year study should emphasize reading and advanced composition. Suitable texts are Riehl's *Der Fluch der Schonheit*, Freytag's *Bilder aus der deutschen Vergangenheit*, Lessing's *Minna von Barnhelm*, *Schiller's Wilhelm Tell*, and Heine's *Die Harzreise*. The fourth-year's work should mark a decided advance in the mastery of vocabulary and idiom as shown both in speaking and writing. The works read may be made the basis for themes. The following reading matter is suggested: Freytag's *Soll und Haben*, Fulda's *Der Talisman*, Hauff's *Lichtenstein*, Scheffel's *Ekkehard*, Schiller's *Wallenstein*, *Maria Stuart*, or *Geschichte des dreissigjährigen Krieges* (Book III), Dahn's *Ein Kampf um Rom*, Goethe's *Dichtung und Wahrheit* (Books I–IV).

FRENCH, 2 OR 3 UNITS.—The requirement for one unit is indicated under Group A. One unit will also be allowed for second and one each for third and fourth year work. Throughout the second year the course should be a continuation of the first as regards grammar, composition and conversation. At least 250 pages of such texts as Bruno's *Le Tour de la France*, Malot's *Sans Famille*, Mérimée's *Colomba*, and Sarcey's *Le Siège de Paris* should be read. In the third year emphasis should be laid on reading. Some time ought also to be given to advanced composition. Among suitable texts may be mentiond Racine's *Athalie*, Corneille's *Le Cid*, Molière's *Le Bourgeois Gentilhomme*, Sandeau's *Mademoiselle de la Seiglière*, Vigny's *La Canne de Jonc*, Hugo's *La Chute*. From the fourth-year's study increased facility in conversation and composition should be gained, and any modern French, other than technical, should be read with ease. Such texts as the following are recommended: the prose works of Dumas *père*, Hugo's *Ruy Blas*, La Fontaine's *Fables*, Sainte-Beuve's Essays, Taine's *Origines de la France Contemporaine*, Pellissier's *Mouvement Littéraire au* XIXe *Siècle*. At least 600 pages should be read.

Latin, 1 to 4 units.—A credit of one unit will be given for each year's work in Latin, covering in all a standard beginners' book, four books of Cæsar's Gallic War, six orations of Cicero and six books of Virgil's Æneid. It is expected that work in prose composition and sight reading will be included in each subject.

## Mathematics.

Solid Geometry, ½ unit.—See Group A. For other than engineering students.

## Science.

Botary, 1 unit.—The preparation in botany should include individual laboratory work recorded by notes and diagrammatic drawings. Field work is desirable, and should also be accompanied by notes. The notebook and drawings certified by the teacher should be presented at the time of application for entrance credit. The year's course of study should consist of three parts, viz.: 1. The general principles of the anatomy, morphology, physiology, and ecology of seed plants. 2. The natural history of the plant groups. The structure, reproduction, and adaptations to habitat of one or two types from each group should be studied. 3. Classification. A brief study of the subdivisions of the above groups. Ability to determine species of flowering plants is not essential. Any standard textbook covering the above field may be used.

Chemistry, 1 unit.—An elementary text-book, such as Williams's Elements of Chemistry by Brownlee and Others, should be covered by recitations. At least one exercise per week must be devoted to individual work in the laboratory. The pupil must perform forty or more experiments, such as are described in the Report of the College Entrance Examination Board, 1909, and keep a notebook in which he describes the apparatus used, records the phenomena observed, and states the conclusions in his own words, in each experiment.

Geology, ½ unit.—In geology a study of the following subjects should be made: rock-forming minerals, their names and chemical constituents; earthquakes—their cause and effects; volcanoes—distribtion, types, character of eruption, nature of errupted material; supposed physical state of the earth's interior; surface agencies destructive to rocks, with brief illustrations; processes of reconstruction with illustrations; rocks—classification, according to origin, rock fracture and dislocation, rock structure due to erosion, metamorphic rocks, mineral veins and their method of formation; conditions determining land sculpture; the geological periods, with land elevations, and the characteristics of climate, plant and animal life of each period.

Physiography, 1 unit.—This course should include a consideration of the earth as a globe, the atmosphere, the waters of the earth, the lands, life upon the earth, and the reactions between these elements. Special attention should be given to the questions of climate, the winds, the weather, tides, ocean currents, and to the effect of the ocean in modifying climatic conditions. Attention should be directed to the manner in which the land was originally formed and to the way in which the original formation has been and is being modified by the action of erosion, the winds, and frost. Throughout the course consideration should be given to the manner in which the various physical characteristics of the earth have affected life upon its surface.

Physiology, ½ unit.—The text-book work should cover material equivalent to that of Martin's Human Body or Hough and Sedgwick's Human Mechanism. In addition the applicant should present a notebook, showing laboratory work upon the elementary physiological processes and general structure of mammals.

Zoölogy, 1 unit.—The work should include: 1. The general natural history of a number of common vertebrates and invertebrates common to the locality where the work is given. 2. The classification of these forms into phylum, class and order, with the characteristics of the several groups. 3. The main anatomical features of one vertebrate, two arthropods (one an insect); an annelid, preferably the earthworm, a coelenterate, two protozoans (Amœba and Paramoecium recommended). 4. The general physiology of the above types involving digestion, absorption, circulation, excretion, and nerve function. These should be compared with the same functions in the human body. 5. The following subjects should be brought before the student in connection with the foregoing studies: asexual and sexual reproduction, alternation of generations, regeneration, fertilization, and segmentation of egg cells; adaptation; variations, evidences of relationship between similar groups, the cell structure of animals.

Certified notebooks must be presented, which include notes upon work and discussion in classroom and drawings of the forms dissected.

## History, 1 unit.

See Group A.

## Drawing, 1 unit.

This may be either freehand or mechanical. If freehand drawing is offered, the candidate should submit at least fifteen drawings, the majority to be in pencil, certified as his work by the instructor. These should show ability to sketch from various objects with considerable accurancy of proportion and clearness of line, and a fair understanding of the rules of perspective and light and shade as applied in freehand sketching. A candidate may also present the equivalent of five hours per week for one year in elementary mechanical drawing, lettering or sketching from models.

## Domestic Science, 1-2 unit.

In domestic science the student must present satisfactory evidence of knowledge in the following subjects: the use and care of the kitchen equipment, general cleaning processes, the marketable forms of staple foods. She must also show credit for at least twelve cooking laboratory lessons of two hours each.

## Shop Practice, 1-2 unit.

The candidate may offer carpentry or any of the various forms of benchwork given in a well-equipped manual training school, equivalent to five hours per week for one-half year.

### Farm Practice, 1-2 unit.

By "farm practice" is meant familiarity with the operations of the farm, such as the harnessing of teams, the use of tillage implements, and the care of dairy animals.

## Degrees.

The degree of Bachelor of Science is conferred upon a student who has completed one of the four-year courses outlined on pages 18–27. The degree of Master of Science is conferred upon those holding a Bachelor's degree from this institution, in regular order, or from other institutions having equal requirements, upon the completion of one year of resident study, the presentation of a satisfactory thesis in applied or economic science, and upon passing examinations in the subjects pursued. Candidates not graduates of this college must file with the committee on graduate study, not later than October first, a detailed statement of their previous work, certified by the proper authorities. They must select, not later than November fifteenth, a major and a minor subject which must be closely related and have the approval of the committee on graduate study and of the professor in whose department the principal work is done. Major subjects may be selected in any of the following departments: agriculture; botany; chemistry; zoölogy; home economics; electrical, mechanical, and civil engineering. The minor may be selected from undergraduate subjects outlined in the catalogue; the major, however, must be advanced work specially arranged with the individual professor. The thesis must be typewritten, upon paper of the size and quality prescribed, and two copies must be in the hands of the president not later than June first.

The requirement for the degree of Mechanical Engineer, Electrical Engineer, or Civil Engineer, consists of three years of successful professional practice subsequent to the Bachelor's degree, one of which must have been in a responsible position; the presentation of an acceptable thesis; and the passing of examinations upon the investigations involved in the thesis.

A registration fee of five dollars is charged for an advanced degree. Students from outside the state pay a tuition fee of thirty dollars during the year of residence. The cost of a diploma is five dollars.

## Teachers' Certificates.

The following resolution adopted by the Board of Education of this state is self-explanatory: "The certification of the president (of this college) that an applicant for a teacher's certificate has pursued a secondary school course of four years, subject to the approval of the committee on qualifications, and in addition thereto has pursued a four years' collegiate course in the Rhode Island College will be received as evidence of the required qualifications in scholastic subjects for a teacher's certificate of the first grade."

By action of the Regents of the State of New York, taken June 9, 1910, the degrees of B. S. and M. S. from this college are accepted as a basis for the issuance of licenses to teach in that state.

## Opportunities Offered to Women.

The course in home economics is especially designed for women, although all other courses are open to them. Special waiting and study rooms are provided for the women who are day students. For statements of accommodations for boarding students, see page 39.

## Expenses.

Tuition is free to residents of Rhode Island. To non-residents of the state, tuition is $15.00 a term or $30.00 a year.

The regular college expenses are tabulated as follows:

| | |
|---|---|
| Board, $3.75 per week | $135 00 |
| Room-rent, including heat and light | 30 00 |
| Incidental fee, $4.50 per term | 9 00 |
| Laboratory deposit, $5 per term | 10 00 |
| Uniform for military drill, estimated | 16 00 |
| | $200 00 |

The first four items must be paid quarterly in advance; that is to say, $46.00 will be required at the opening of the year, September 20, 1911, and also at each of the following dates: November 27, 1911, February 14, 1912, and April 17, 1912. Non-residents of the state should add to this sum $7.50 for tuition each quarter. In order to secure dormitory accommodations, the student is required to deposit one dollar with the application, the dollar to be credited on the fall-term room-rent. If the student fails to take the room, the dollar is forfeited. The uniform also must be paid for at the opening of the college year, in advance. Against the laboratory deposit will be charged all material used in the various laboratories, and the destruction, breakage, or marring of apparatus and tools. If anything remains after such deductions have been made, the said remainder will be refunded. If, on the other hand, the charges shall at any time exceed the deposit, the student will be required to cover the excess by a further deposit.

Nothing has been said concerning books. The probable cost of these will be from $15.00 to $30.00 per year. For miscellaneous expenses connected with college life, students should add a sum varying from $10.00 to $25.00. A fee of 50 cents will be charged for each second examination to make up a condition. Graduates pay the cost of diplomas, $5.00. *No diplomas will be issued until all term bills have been paid.* Room-rent and incidental deposit will not be refunded on withdrawal during the quarter. Students not taking any laboratory work will not be required to make a laboratory deposit. An athletic tax, levied by the students upon themselves, will be taken at the college office at the times set for college dues.

UNIFORM.—Every able-bodied male student is required to drill and to wear a uniform. The uniform must be paid for immediately on entering the college, when the students are measured for the suits. When worn only on drill and properly cared for, one uniform may last two or more years. The student may, however, wear his uniform all the time.

TRANSPORTATION.—The college conveys students daily to and from the railroad station free of charge. Once at the beginning and end of each term, a team conveys trunks to and from the station.

BOARDING STUDENTS.—The price of board for 1911–12 will be $3.75 per week. Students who *leave regularly every week* on Friday afternoon and return Monday morning will receive a rebate for time of absence. No person will be admitted to the dining-room until he has secured from the bursar a meal ticket, on the back of which will be found the rules governing the holder of such ticket. After this ticket is issued, all charges for board will be made in accordance therewith, unless the student has the ticket changed by the bursar. Arrangement of charges for meals sent to students' rooms for any cause must be made in advance.

DORMITORIES FOR MEN.—East Hall is now in use, affording excellent accommodations for men students. The two upper floors are entirely devoted to rooms for students. The sanitary conveniences on each floor are excellent and ample, including a full complement of shower baths. The first floor contains a large assembly hall, a handsome social room for the men, and a dining-room and kitchen fitted out with all modern equipment. South Hall is also devoted to the use of the young men and affords very desirable rooms for dormitory purposes.

Dormitory for Women.—During the summer of 1909 the interior of Davis Hall was entirely reconstructed. On the first floor are the administration offices. With the exception of the offices of the extension department on the second floor, the upper floors of the building are utilized for the women's department. The accommodations for women students in this building are under the direct supervision of a dean, and compare favorably with those at any women's college in the country. There is a neat hospital, with all necessary adjuncts. The oversight of the young women is efficient, kindly, and painstaking. Attention is especially invited to the new facilities and arrangements for the welfare of young women.

Furniture.—The rooms in the women's dormitory are provided with necessary furniture, including mattresses, but no other bedding material. *All students in the men's dormitory are required to supply their own furniture and bedding.* The necessary furniture may be obtained at the college when desired. A room may be furnished for from $8.00 to $10.00. Iron bedsteads three feet wide are included under room-rent. The furniture, if properly kept, may be sold, when the student leaves, for one-half to three-fourths the original price. All students should bring with them such articles as sheets, blankets, pillow, pillow-slips (all for single bed), and towels. Men students are required to purchase mattresses at the college.

Rooms in the Village.—Arrangements have been made for rooms in the village of Kingston, some of these being under college management and others in private houses. In the case of the former, room rent will vary from 60 cents to $1.00 per week, with heat and light furnished, the student to provide other furnishings. Furnished rooms in private houses for students who occupy them throughout the college year range from $1.25 to $2.00 per week.

College Store.—Students will be required to pay cash at the store for all books and other supplies.

Damage Fund.—All damage not due to ordinary wear will be assessed to students as follows:

1. Students at once acknowledging damage and agreeing to pay for same will be assessed actual cost of repair, including labor.

2. Students found guilty of such damage but not acknowledging and settling for the damage will be charged double the cost of repair.

3. Students will be responsible for damage in their own rooms. Damage that is not settled as above may be assessed to all the students or to a group of students, pro rata. Each case and the amount of assessment will be considered on its merits.

## Employment at the College.

There is a certain amount of labor about the college buildings, on the farm, at the experiment station, and in the offices and laboratories, for which students will be employed whenever it is feasible to do so. Industrious students frequently earn an amount which aids considerably in paying their expenses,—a sum varying from $25.00 to $125.00 per year.

In view of the fact, however, that the amount of this work is strictly limited and that it is not the policy of the college to create such work, and, furthermore, because of the increasing number of students and the more frequent applications for student labor, it seems desirable to state the conditions under which this work will hereafter be assigned.

1. Application for work must be made on a blank which will be issued to the student on request. *Persons desiring such work must, if under age, bring a statement certifying to what extent the student must depend upon himself for support.* It must be borne in mind that the student can not make this certification for himself. Application for work, however, under no circumstances creates a claim on the college that work shall be assigned the applicant.

2. At a certain time before the opening of the fall term all applications for work will be considered and appointments will be made after due consideration of

(a) Capability for the work.
(b) Trustworthiness.
(c) Good record as a student.
(d) Need for financial aid.

[NOTE: Other things being equal, preference will be given to residents of the state, to upper-class students, and to those who room and board at the college.]

3. Such appointments are subject to revocation at any time, for
   - (a) Incompetency.
   - (b) Unfaithfulness in discharge of duty.
   - (c) Misconduct or disloyalty to the institution.
   - (d) Bad record in studies.

4. Such appointments must be recognized as
   - (a) A mark of trust and responsibility.
   - (b) A real and vital part of one's training for promptness, for initiative, and for leadership.
   - (c) One of the very best criteria the teacher has in determining his estimate of the student's character, both for his own guidance and for recommendation to employers.

5. Payment for services will vary from ten to fifteen cents per hour, according to the grade and difficulty of the work and the experience of the student. In general, students should not expect more than ten cents an hour for the first year. It is a rule of the college that any student desiring to perform more than twenty hours of student labor per week must secure permission from the faculty council. In the future, it may be necessary to limit the amount which any one student may receive for student labor.

Some young people have the impression that the college offers such opportunities for self-help that it is safe to enter with practically no funds, relying solely on money earned while here. In exceptional cases this may be done, but prospective students are strongly advised not to enter until they have at least $100.00 at their disposal. A student who has to make his own way must also plan to work steadily during both the short and long vacations. Occasional vacation work at the college can be furnished to students, but as a rule they should look elsewhere for this class of work.

## Religious Influences.

This college is a state institution, and consequently, the widest latitude is given to all creeds and forms of religious belief. Simple chapel exercises are held, and are conducted by the president or some other member of the faculty. While in the main, attendance is not compulsory, it is desired and expected that all students will attend chapel. On one day of each week special exercises are held which all are required to attend.

A branch of the Intercollegiate Young Men's Christian Association is doing active work among the men students, holding a meeting every Sunday throughout the year. This association conducts courses in bible study, and is taking the lead in endeavoring to establish sound and high ideas of college life.

The Young Women's Christian Union is doing a similar work for the young women.

The village church cordially invites all students to attend its services and if possible, to join its membership. Every effort is made by the college to minister to the higher life of the students and to bring before them the noblest ideals, without in any way attempting to coerce them to particular beliefs.

## The College Lecture Association.

Faculty and students, uniting with residents of the vicinity, conduct a winter lecture course, the aim of which is to introduce talented speakers upon subjects both entertaining and instructive. The association may be looked upon as a permanent and important factor in college activities. For the seacon of 1910—1911 the following program was secured:

| | |
|---|---|
| Nov. 20. | Frederick W. Bancroft, Song Recital. |
| Dec. 16. | Edward H. Frye, "The Man from Home." |
| Jan. 26. | Ex-Governor Hoch, "A Message from Kansas." |
| Feb. 18. | Frank Speaight, "Pickwick Papers." |
| Mar. 17. | Henry J. Kilbourn, "Italian Cities." |
| April 14. | Hayden Concert Company. |

## Honors and Prizes.

### THE KINGSTON PRIZE.

For some years the sum of sixty dollars has been offered annually by a friend of the college to encourage literary work among the students. In 1910, this sum was divided equally among the departments of engineering, science, and agriculture, and two prizes, one of fifteen and a second of five dollars, were awarded in each department for the best essays as follows:

ENGINEERING:
Dorothy Walcott Caldwell, *first prize*; Richard Howes Wheeler, *second prize.*

SCIENCE:
Rudolf Wilhelm Ruprecht, *first prize*; Allae Cordelia Slater, *second prize.*

AGRICULTURE:
Patrick Joseph Healy, *first prize*; Clarence Bland Edwards, *second prize.*

## HONORS.

Honors awarded Commencement Day, June 9, 1910:

SENIOR
Paul Steere Burgess.

JUNIOR
Patrick Joseph Healy.

SOPHOMORE
Henry Newell Barlow,
Carle Muzzy Bigelow,
Walter Doll,
Allae Cordelia Slater.

FRESHMAN
Ralph Irwin Alexander,
Dorothy Dearborn Elkins,
Marguerite White Elkins,
Alice Edith Ford,
Arthur Leslie Reynolds.

FINAL HONORS
Paul Steere Burgess,
Helen Scott Lamond,
David Elbridge Worrall.

## ERRATA.

PAGE 43. UNDER "HONORS."

For the word "Senior" in first line, read "Final Honors."

For the words "Final Honors" in last line, read "Senior Honors."

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David Elbridge Worrall.

## The Library.

The library occupies a large room in Lippitt Hall, and numbers over seventeen thousand volumes. The books are arranged in stacks, to which the students have free access. The Dewey system of classification is used; and a dictionary catalogue gives author, title, and subject entries. As the library has been from the first intended for reference work, the various departments of instruction have made their selections with the greatest care. Combined with the library is the reading-room, where one hundred and twenty of the leading periodicals—of literary, scientific, and general interest—are on file. From time to time these are bound, and prove of great value in reference work.

Since the library has been a government depository, twenty-five hundred books and pamphlets have been received, which are of value in scientific investigation and research.

The library is open every week day from 7:30 A. M. to 6:00 P. M., with the exception of an hour at noon. The librarian or her representative is in constant attendance, to aid any one in search of information. As the college is an institution designed to further the educational interests of Rhode Island, all residents of the state are at liberty to use its library.

## Location.

The college campus is one and one-half miles from Kingston station, which is at the junction of the main line of the N. Y., N. H. & H. R. R. with the Narragansett Pier branch, thus insuring excellent railroad accommodations. The buildings are on a hill which commands an extended view of the surrounding country—a location both healthful and beautiful. Sixteen trains stop daily at the station, so that the college is accessible from Providence or from New York City at almost any hour in the day. The ride from Providence is about forty to forty-five minutes in length. From New York the time is some four hours.

# Departments of Instruction.

The following subjects are offered in the different departments. All subjects in the departments of instruction preceded by a Roman numeral count towards the degree of B. S. All subjects preceded by a capital letter lead to a certificate.

## Agriculture.

PROFESSOR ADAMS, PROFESSOR PUTNEY, ASSISTANT PROFESSOR COBB, MR. BURDICK, MR. MALLETTE, MR. LAMBERT.

The instruction given in this subject is grouped under the three heads—agronomy, animal husbandry, and horticulture. The aim is to give such theoretical and practical training in the fundamentals of agriculture as will enable those who take this work to fill positions of trust and responsibility, either as owners of their own farms, managers of estates, or along other lines of agricultural activity.

That the graduates from this department may be fitted to take up the work outlined above, all students registered for a degree in agriculture will be required to show certain familiarity with the ordinary operations of the farm, before such degree is given.

In order that those students who have not had an opportunity to receive training in the practical work of the farm may become familiar with some of the more common operations, they will be required, during their connection with the college, to do a certain amount of routine farm work without pay. This will include work in the dairy barn, poultry yard, greenhouses and gardens. This training will be in addition to the laboratory credits prescribed in the regular course. The amount of such work required will depend upon the efficiency shown by the student. No college credits will be given for this work, yet the neglect of this phase of the training may be considered a sufficient cause for dismissal from the institution. Students may be required to spend one or two summers upon farms in order to get additional training. Persons taking practical work upon farms during the summer vacations will be required to furnish a certificate from their employers, stating the time spent on the farm and the kind and amount of work accomplished. Special attention must be given to that branch of agriculture which the student is to elect during the Senior year.

## AGRONOMY.

PROFESSOR ADAMS, MR. BURDICK.

The instruction in agronomy begins the first term of the Sophomore year, when a study is made of the forage plants. Following this work are subjects dealing with the other field crops and their uses as food for man and beast. In the work with soils and fertilizers, especial emphasis is placed upon the problems connected with the proper use of chemical manures.

The business side of farm life is given attention in the subjects treating of farm equipment and management. Work with farm machinery is a laboratory course, in which the students are taught how to care for, repair, and operate modern farm machinery. In the Senior year there is instruction in plant breeding, a subject which is of the utmost importance to one who would make the most of the opportunities in crop production. Instruction in agricultural experimentation deals largely with the application of the results which have been obtained by the experiment stations, to the practical problems of the farm.

The equipment of the department includes the college farm and barns; also the farm machinery, consisting of a good line of tillage implements, fertilizer distributors, grain drill, and harvesting machinery. A well-equipped blacksmith shop is also provided.

Students have the advantage of the field experiments which are being conducted by the experiment station upon fertilizer problems and with various rotations.

### Subjects.

II. Forage Crops.—History and development of the plants used for forage; silage, methods of construction of silos. *Two recitation credits per week, first term. Required of Sophomores in Agriculture.*

III. Soils and Fertilizers.—Origin and constituents of soils; texture, moisture, drainage, methods of tillage. Farm manures, artificial manures, composition and use; formulas for various crops. *Four recitation and one and one-half laboratory credits per week, first term. Required of Juniors in Agriculture. Option for Juniors in Applied Science. Prerequisite: Chemistry* I *and* II.

IV. Farm Crops.—Origin and history; production and place in the rotation of clovers, grasses, and root crops. *Three recitation credits and one laboratory credit per week, second term. Required of Juniors in Agriculture. Option for Juniors in Applied Science. Prerequisite: Botany* I *and* II.

VI. Farm Machinery.—Development of farm machinery, methods of construction, function, and operation. *Two recitation credits and one laboratory credit per week, second term. Required of Juniors in Agriculture.* Mr. Burdick.

VII. Farm Management.—Discussion of agricultural methods, choice of a farm, capital, marketing, types of farming, accounts. *Two recitation credits per week, second term. Required of Juniors in Agriculture. Prerequisite: Agronomy* III *and* IV.

VIII. Farm Management (advanced).—Individual problems of farm management are assigned. Abandoned farms will be visited and a critical study made of the existing conditions. *Two recitations credits per week, first term. Option for Seniors in Agriculture.*

IX. Literature.—History of agricultural and horticultural literature; a study of the different types of agricultural literature as illustrated by ancient and modern authors. Reports upon special topics. *Two recitation credits per week, second term. Option for Seniors in Agriculture.*

X. Agricultural Experimentation.—Objects, methods, and results of agricultural experimentation. A study of federal and state aid to agriculture as shown in the work of the United States Department of Agriculture and the Experiment Stations. *Three recitation credits per week, first term. Required of Seniors in Agriculture.*

XI. Plant Breeding.—A discussion of the development of plants under cultivation; with reference to heredity, environment, variation, and selection. *Three recitations credits per week, first term. Required of Seniors in Agriculture. Option for Seniors in Applied Science. Prerequisite: Botany* I *and* II.

A. Soils and Fertilizers.—An elementary course upon the origin and nature of soils. Fertilizers; natural and artificial manures; preparation and use; fertilizer arithmetic. *Four recitation credits and one laboratory credits per week, second term. Required of Short-Course students in Agriculture, first year.*

B. Crops and Rotations.—Methods of culture and uses of the grasses, clovers, cereals, and root crops. Rotation for the various types of farms. *Three recitation credits and one laboratory credit per week, first term. Required of Short-Course students in Agriculture, second year.*

C. Farm Management.—An elementary course upon the principles of farm management, equipment, cost of production. *Four recitation credits per week, second term. Required of Short-Course students in Agriculture, second year.*

D. Farm Machinery.—Care and repair of farm implements. *One recitation and two laboratory credits per week, second term. Required of Short-Course students in Agriculture, second year.* Mr. Burdick.

## ANIMAL HUSBANDRY.

PROFESSOR PUTNEY, MR. BURDICK, MR. LAMBERT.

Instruction in animal husbandry is so arranged as to furnish practical as well as theoretical instruction in the selection, care, and management of the live stock on the farm. Instruction commences in the second term of the Freshman year, with a study of the breeds, their care, and judging of types. These courses aim to provide a large amount of practical work in combination with the theoretical. In the Junior year attention is directed to dairying; and in the Senior year the work includes advanced judging, the management of pure-bred herds, flocks, and studs, and the scientific study of feeding farm live stock.

Instruction in poultry culture is given during the second term of the Freshman year, and is both theoretical and practical. In the Senior year an option is offered in advanced poultry judging. The equipment is particularly strong on the poultry side. The college poultry plant enables one to obtain a large amount of practical experience in incubation, brooding, and management. In addition to the poultry in the college yards, the students have opportunity to follow the investigations which are now being conducted by the experiment station. In addition to the subjects mentioned below, there is a six-weeks' course in poultry keeping during the winter months, full information concerning which may be obtained by addressing the president of the college.

### Subjects.

I. Stock Judging.—Scoring and comparison of various types of horses, cattle, sheep, and swine. Study of the special purpose or special type animal. *Two laboratory credits per week, second term. Required of Freshmen in Agriculture.* Professor Putney.

II. Advanced Judging.—Practice in judging and detail study of types. Herd testing methods. Tracing of pedigrees. *Two laboratory credits per week, first term. Option for Seniors in Agriculture.* Professor Putney.

III. Breeds.—History and character of the principal breeds of farm animals. Study of conditions to which each is adapted. *Two recitation credits per week, second term. Required of Freshmen in Agriculture.* Professor Putney.

IV. Principles of Breeding.—A study of the science and art of breeding. Discussion of the laws of heredity as applied to improvement of animal types. *Three recitation credits per week, second term. Required of Seniors in Agriculture. Option for Seniors in Applied Science. Prerequisite: Animal Husbandry* III *and Zoölogy* III. Professor Putney.

V. Management of Pure-Bred Herds, Flocks, and Studs.—Selection of foundation stock. Housing, feeding, and care. Advertising, fitting for sale and show ring. *Two recitation credits per week, second term. Option for Seniors in Agriculture.* Professor Putney.

VI. Feeding Farm Animals.—Principles of animal nutrition. Feeding standards. Making up balanced rations. *Three recitation credits per week, first term. Required of Seniors in Agriculture. Option for Seniors in Applied Science Prerequisite: Chemistry* IV *and* XIV. Professor Putney.

VII. Dairy Practice.—Lectures and laboratory practice in Babcock test and in handling milk and making butter on the farm. *One recitation and one and one-half laboratory credits per week, first term. Required of Juniors in Agriculture.* Mr. Burdick.

VIII. Dairy Practice.—Advanced work. Pasteurization. Starters. Testing for adulteration. Acidity. Moisture. *One recitation and two laboratory credits per week, second term. Option for Seniors in Agriculture.* Mr. Burdick.

IX. Research and Literature.—*Hours to be arranged, first term. Option for Seniors in Agriculture.* Professor Putney.

X. Veterinary Medicine.—Combating disease from the farmer's standpoint. Obstetrics. Injuries. *Three recitation credits per week, second term. Required of Seniors in Agriculture. Prerequisite: Zoölogy III.* Professor Putney.

XI. Farm Buildings.—Plans, location, and estimate on the various farm buildings. *Two laboratory credits per week, second term. Option for Juniors in Agriculture, and Seniors in Applied Science.*

XII. Poultry Craft.—A brief study of breeds, care, and management of all classes of fowls. *One laboratory credit per week, second term. Required of Freshmen in Agriculture. Option for Seniors in Applied Science.* Mr. Lambert.

XIII. Judging Poultry.—Practice in scoring and judging all classes of fowls. *Two laboratory credits per week, second term. Option for Seniors in Agriculture.* Mr. Lambert.

XIV. Poultry Husbandry.—Special subjects to be assigned. *At least two laboratory credits per week, throughout the year. Option for Seniors in Agriculture.* Mr. Lambert.

A. Breeds.—Breeds of horses, cattle, sheep, and swine. Emphasis is placed on the type best fitted to the agriculture of New England. *Two recitation credits per week, first term. Required of Short-Course students in Agriculture, first year.* Professor Putney.

B. Stock Judging.—Judging of the various classes of animals and their adaptability to different purposes, as cattle for milk or beef production, horses for driving or draft. *Two laboratory credits per week, first term. Required of Short-Course students in Agriculture, first year.* Professor Putney.

C. Dairy Practice.—Babcock test for dairy products, production of sanitary milk, and butter making. *One recitation and two laboratory credits per week, first term. Required of Short-Course students in Agriculture, second year.* Mr. Burdick.

D. Stock Feeding.—Principles of nutrition. Compounding rations. *Three recitation credits per week, first term. Required of Short-Course students in Agriculture, second year.* Professor Putney.

E. Principles of Breeding.—A study of the selection of animals, heredity, and variation. *Two recitation credits and one laboratory credit per week, second term. Required of Short-Course students in Agriculture, second year.* Professor Putney.

F. Poultry Breeds and Care.—A study and comparison of the different breeds of poultry, care of incubators and brooders, methods of feeding for the production of meat and eggs. *One recitation and one laboratory credit per week, throughout the year. Required of Short-Course students in Agriculture, second year.* Mr. Lambert.

G. Care of animals.—Housing, care, and management of farm animals. Practical directions for handling of stock on the farm. *Two recitation credits per week, first term. Required of Short-Course students in Agriculture, second year.* Professor Putney.

## HORTICULTURE.

### ASSISTANT PROFESSOR COBB.

The aim of the instruction in horticulture is to help the student to understand the practical and scientific problems which arise in the various lines of work included under this subject.

The headquarters of the department are in the horticultural building. The main building contains the office and recitation rooms, together with photographic rooms. Attached to this building are greenhouses of modern construction, containing over 8,000 square feet under glass, 3,000 square feet of which is used by the experiment station for fertilizer experiments. The remainder is devoted to college work, and thus affords an excellent opportunity to become familiar with the growth of plants under glass. The land devoted to the department comprises the college gardens; and the fruit orchards, containing over 150 varieties of fruit, which afford an excellent opportunity for the study of apples and pears especially. There is also a small vineyard. A collection of flowering shrubs enables the student in landscape gardening to study, in the natural state, the material used in this work.

## Subjects.

I. Propagation of Plants.—Different methods, including seed testing. Soft, green, and hardwood cuttings. Layering, grafting, and budding. *One recitation and one laboratory credit per week, first term. Required of Freshmen in Agriculture and Applied Science.*

II. Vegetable Gardening.—Underlying principles and types of vegetable gardening; study of individual crops; text-book work. *Two recitation credits per week, first term. Required of Sophomores in Agriculture. Option for Juniors in Applied Science.*

III. Fruit Culture.—Fundamental principles of orcharding; soil, fertilizer, and cultivation. Methods of laying out orchards and planting. Tillage, pruning, and spraying. Harvesting and storing fruits. Collateral reading and practical work. *Two recitation credits per week, first term. Required of Juniors in Agriculture. Option for Juniors in Applied Science.*

IV. Spraying and Pruning.—Preparation and application of spray mixtures; insecticides and fungicides. Methods of application for different orchard enemies, and machinery used. Pruning of trees and ornamental shrubs. *One recitation and one laboratory credit per week, second term. Required of Freshmen in Agriculture. Option for Juniors in Applied Science.*

V. Greenhouse Construction and Management.—Study of the different types of glasshouse structures; methods of heating and ventilating. *One recitation and two laboratory credits per week, second term. Option for Seniors in Agriculture.*

VI. Floriculture.—History of floriculture. Study of greenhouse plants, collectively and individually; practical work in propagation, potting, watering, ventilating, fumigating, and spraying. Study of bulbs, bedding plants; palms and ferns. *One recitation and one laboratory credit per week, second term. Option for Seniors in Agriculture and Applied Science.*

VIII. Literature of Horticulture.—See Agronomy IX.

IX. Assigned Work.—Special subjects chosen by the student. *Option for Seniors in Agriculture. Hours to be arranged.*

X. Varieties of Fruits.—Orchard and bush fruits. Study of types; origin, and history; classification, description, and methods of handling. Orchard management. *Two recitation credits and one laboratory credit per week, first term. Option for Seniors in Agriculture. Prerequisite: Horticulture* III.

XI. Advanced Vegetable Gardening.—Study of one or more crops selected by student. Practical work, research work, and text-book. *One recitation credit per week, first term. Option for Seniors in Agiculture.*

XII. Plant Breeding.—See Agronomy XI.

XIII. Landscape Gardening.—Origin, history, and underlying principles. Practical work in the laying out of grounds, formation of walks and drives; methods of planting for different effects; home planting. *Two recitation credits and one laboratory credit per week, throughout the year. Required of Seniors in Agriculture. Option for Seniors in Applied Science. Prerequisite: Botany* I *and* II.

XIV. Arboriculture.—Study of ornamental trees, shrubs, and other plants, both native and exotic, which are used in landscape gardening. This course is designed to enable the student to become familiar with the character, habits, and adaptation of ornamental plants. *One recitation and one laboratory credit per week, first term. Option for Seniors in Agriculture.*

XV. Tree Surgery.—A study of methods used in treating diseases of trees and shrubs. Treatment of insect injuries, preventive and remedial measures to be used in case of neglect, and mechanical injuries, such as chaining and bolting. Cement filling of cavities. *One recitation and two laboratory credits per week, second term. Option for Seniors in Agriculture.*

A. Vegetable Gardening.—Fundamental principles of vegetable growing. Practical work in cold frames, hotbeds,and garden planting. *Two recitation credits and one laboratory credit per week, second term. Required of Short-Course students in Agriculture, second year.*

B. Fruit Culture.—Study of fruits; propagation; planning fruit gardens and plantations; harvesting and packing; care. *Three recitation credits per week, first term. Required of Short-Course students in Agriculture, second year.*

C. Nursery Practice.—Propagation by seed, cuttings, grafting, budding, starting, and care of nursery. Selection of stock, and initial pruning. *One recitation and one laboratory credit per week, first term. Required of Short-Course students in Agriculture, second year.*

D. Floriculture.—Propagation of flowering plants, care of window gardens, design of flowerbeds and borders. *Two laboratory credits, second term. Required of Short-Course students in Home Economics, first year.*

E. Spraying and Pruning.—A study of the methods used in combating insect pests and plant diseases. Preparation and application of fungicides and insecticides. Study of nozzles, pumps, etc. *One recitation and one laboratory credit per week, second term. Required of Short-Course students in Agriculture, second year.*

F. Home Grounds.—A study of the materials to use, the essential principles of the art. Practice in designing, planting, and care of home grounds. *Two recitation credits per week, second term. Required of Short-Course students in Agriculture, second year.*

## Botany.

PROFESSOR MERROW.

The aim of the department is to give a general knowledge of plant life, followed by subjects of an economic nature. The college is well located for carrying on this line of work. The native flora is extensive, and an abundance of material is furnished by the cultivated plants of the gardens and fields of the college farm. The greenhouses supply fresh material for winter use, and the herbarium of 4,300 specimens is a useful reference collection. The laboratory is equipped with dissecting and compound microscopes, a microtome, paraffin bath, and simple physiological apparatus. Charts and models are provided for lecture demonstrations. A good working library, including several American and foreign periodicals, is an important factor in the outfit for botanical instruction.

## Subjects.

I. General Botany.—A study of common plants, their structure, physiology, evolution, and adaptation to environment. The work includes a brief study of molds, yeasts, and bacteria, designed as an introduction to problems in which these organisms play a part. *Two laboratory credits and one recitation credit per week, throughout the year. Required of Freshmen in Agriculture, Applied Science, and Home Economics.*

II. Economic Botany.—The systematic botany of crops and weeds. *Two laboratory credits and one recitation credit per week, first term. Required of Sophomores in Agriculture and Applied Science.*

III. Trees and Shrubs.—The determination of native and introduced trees and shrubs in summer and winter condition. *One laboratory or field credit per week, throughout the year.* May be elected by students having a minimum of six credits in Botany.

IV. Forestry.—The management of a southern New-England wood lot. *Two credits per week, second term. Required of Juniors in Agriculture. Elective in Applied Science.*

V. Histology.—Seed plants as studied by the usual histological methods of imbedding, sectioning, and staining. *Four laboratory credits and one recitation credit per week, first term. Elective.*

VI. Pathology.—Diseases caused by parasitic fungi and the remedies for them. *Four laboratory credits and one recitation credit per week, second term. Elective.*

VII. Assigned Work.—*Three credits, throughout the year Elective for Seniors in Applied Science.*

A. Plant Life.—Elementary agricultural botany. *Two laboratory credits and one recitation credit per week, throughout the year Required of Short-Course students in Agriculture and Domestic Science, first year.*

# Chemistry.

DR. LEIGHTON, MR. SMITH, DR. HARTWELL.

Instruction in this department begins in the Freshman year with experimental lectures, recitations, and laboratory practice in general and descriptive chemistry. The work is designed to give a thorough elementary knowledge of theoretical and descriptive inorganic chemistry, including the principal technical processes, and a brief account of the carbon compounds. As much attention as is practicable in a general course is given to the applications of the science to the problems of life. Two periods per week for the first half-year and three for the second half-year are devoted to the lectures and recitations, and three hours per week for a half-year to the practical work in the laboratory, where the student has an opportunity to verify some of the chemical theories and to become familiar with substances and their chemical behavior. During the second half of this year the laboratory period is devoted to qualitative analysis, which continues through the first half of the Sophomore year. The subject is taught in part by means of recitations and lectures, but mainly by work in the laboratory. Students are required to complete a systematic course in basic and acid analysis, and to analyze correctly a number of alloys, salts, and minerals.

Quantitative analysis is taught mainly by laboratory practice, but sufficient time is devoted to lectures and recitations to teach thoroughly the fundamental principles involved. The work comprises gravimetric and volumetric analysis, and the quantitative determination of salts, alloys, ores, minerals, and commercial and food products. In the course in technical gas analysis the student analyzes such gases as air, and illuminating and chimney gases. The work in assaying is designed to familiarize the student with the practical methods of sampling and assaying gold, silver, and lead ores. Determinative mineralogy, which includes blow-pipe analysis and crystallography, is taught by recitations and laboratory work. The student learns the physical properties of the common minerals, and their identification. The above subjects cover a comprehensive study of analytical chemistry, and are intended to give the student such theoretical and practical knowledge as to prepare him for analytical work of any kind.

The study of organic chemistry begins with a short course, designed to cover the general principles and methods, and to include a description of the more important compounds. The subject is continued by those who wish to specialize in chemistry in a more extended course covering the aromatic series and the chemistry of the dyestuffs, and accompanied by laboratory work in organic preparations and analysis. The theoretical and basic principles of chemistry, with their general application, are thoroughly studied by recitation, lectures, and laboratory work in the course in physical chemistry.

The descriptive side of industrial chemistry, which comprises a general survey of the technical applications of chemical principles to the arts and industries, is studied by recitation work; while practical technical operations, such as textile coloring, suited to the needs of the individual student, are studied by laboratory practice. The principles and practice of the industrial preparation of iron, steel, and other metals from their ores are taught by recitation and lecture work in the course in metallurgy.

Agricultural chemistry, required of agricultural students in the Junior year, embodies the chemistry of soils and fertilizers, also the chemistry involved in the changes which take place during the growth of animals and plants, as well as in the storage or manufacture of the ordinary farm products.

Subject XXI is intended to familiarize the student with the general field of chemical literature, and to inculcate the habit of keeping up with the recent advance in chemical science by reports and discussion of articles appearing in the chemical journals. This course is preparatory for Subject XX, which involves original investigation.

The laboratory is supplied with water, gas, and compressed air at each desk; it is also well equipped with apparatus for the subjects mentioned below. Among the more important pieces of apparatus are a polariscope, microscope, sodium press, hot-air engine, five analytical balances, one assay balance, filter press, Wheatstone bridge, combustion furnace, bomb furnace, assay muffle, crucible and roasting furnaces, ore crusher and grinder.

A good working library, containing a large number of German, French and English chemical journals, is also accessible.

## Subjects.

I. General Chemistry.—*Two recitation and one and one-half laboratory credits per week, first term. Required of Freshmen in all courses.* Mr. Smith.

II. General Chemistry and Qualitative Analysis.—*Three recitation and one and* *one-half laboratory credits per week, second term. Required of Freshmen in all courses.* Dr. Leighton.

III. Qualitative Analysis.—Basic and acid analysis; analysis of salts, industrial and natural products. *Three laboratory credits per week, first term. Required of Sophomores in all courses.* Dr. Leighton and Mr. Smith.

IV. Organic Chemistry.—*Three recitation credits and one laboratory credit per week, second term. Required of Sophomores in Chemical Engineering, Home Economics, Agriculture, and Applied Science. Elective for others who have completed Chemistry* III. Mr. Smith.

V. Organic Chemistry (advanced).—To be given alternate years. Given next in 1911. *Three recitation credits and one laboratory credit per week, first term. Required in Chemical Engineering and of those who take the Chemical Option in Applied Science. Elective for others who have completed Chemistry* IV.

VI. Organic Chemical Laboratory.—*Three laboratory credits per week, second term. Required of Juniors in Chemical Engineering and of those who take the Chemical Option in Applied Science. Elective for others who have completed Chemistry* IV. Mr. Smith.

VII. Quantitative Analysis.—Gravimetric and volumetric analysis. Analysis of minerals, ores, alloys, and industrial products. *Three laboratory credits per week, second term. Required of Sophomores in Chemical Engineering. Elective for others who have completed Chemistry* III. Mr. Smith.

VIII. Quantitative Analysis. *Three laboratory credits per week, first term; four and one half laboratory credits per week, second term. Required of Juniors in Chemical Engineering and Juniors who take the Chemical Option in Applied Science. Elective for those who have completed Chemistry* III. Mr. Smith.

X. Quantitative Analysis.—Food Analysis. *Four laboratory credits, first term. Required of Seniors in Home Economics. Elective for others who have completed Chemistry IV.* Dr. Leighton.

XI. Determinative Mineralogy.—*One and one-half laboratory credits per week, second term. Required of Juniors in Chemical Engineering and of Juniors who take the Chemical Option in Applied Science. Elective for others who have completed Chemistry III.* Mr. Smith.

XII. Physical Chemistry.—To be given alternate years. Given next in 1912. *Three recitation credits and one laboratory credit per week, first term. Required in Chemical Engineering and of those who take the Chemical Option in Applied Science. Elective for others who have completed Chemistry III.* Dr. Leighton.

XIII. Metallurgy.—*Two recitation credits per week, second term. Required of Seniors in Chemical Engineering. Elective for others who have completed Chemistry II.* Mr. Smith.

XIV. Agricultural Chemistry.—*Three recitation credits and one laboratory credit per week, first term. Required of Juniors in Agriculture. Prerequisite: Chemistry* (I–IV). Dr. Hartwell.

XV. Gas Analysis.—See Mechanical Engineering XV.

XVI. Industrial Chemistry.—*Four recitation credits per week, second term, Required of Juniors in Chemical Engineering and of Seniors who take the Chemical Option in Applied Science. Elective for othere who have completed Chemistry IV.* Mr. Smith.

XVII. Industrial Chemistry.—The work under this subject mav be varied to suit the needs of individual students; including such subjects as technical analysis and textile coloring. *Three laboratory credits per week, second term. Required of Seniors in Chemical Engineering and of Seniors who take the Chemical Option in Applied Science. Elective for those who take Chemistry* XVI. Dr. Leighton.

XVIII. Assaying.—*Two laboratory credits per week, second term. Required of Seniors in Chemical Engineering.* Mr. Smith.

XIX. Physiological Chemistry.—*Four credits per week, second term. Required of Juniors in Home Economics.* Dr. Leighton.

XX. Assigned Work.—*Three credits per week, throughout the year. Required of Seniors in Chemical Engineering and Seniors who take the Chemical Option in Applied Science.* Dr. Leighton.

XXI. Reports and Discussion of Chemical Subjects and Recent Investigations.—*One credit per week, throughout the year; required of Juniors and Seniors in Chemical Engineering. Option for Juniors and Seniors in Applied Science.* Dr. Leighton.

XXII.—Electro-Chemistry. *Three recitation credits per week, second term. Required of Seniors in Chemical Engineering and of Seniors who take the Chemical Option in Applied Science.* Dr. Leighton.

A. Chemistry of Plant and Animal Life.—*Three recitation credits and one laboratory credit per week, throughout the year Required of Short-Course students in Agriculture and Home Economics, first year.* Mr. Smith.

## Freehand Drawing.

MISS ELDRED.

The aim of the subjects described below is to supply the practice in drawing necessary for subsequent work in the science laboratories, to give an elementary knowledge of the history of art, and to develop some appreciation of the beautiful in art and nature. For the first term, the work comprises outline drawing in pencil, mainly from plant and animal forms. The work of the second term includes some consideration of perspective and of the principles of design. In the first term of the Sophomore year the home economics students consider the subject of color,—the principles of color harmony, and the use of color in design and decoration. The object of this work is to develop appreciation of color and to enable the student to exercise a more intelligent and sensitive discrimination in its use. In the Junior year, special work is arranged for the first term to accompany and illustrate the home economics course, treating of the arrangement and decoration of the house. The brief course in the history of art aims to give some familiarity with the greatest achievements of past and present in architecture, sculpture, and painting. The department has a considerable equipment of illustrative material for this work, including a collection of about one hundred and fifty casts and over three hundred photographs of folio or larger size, with many smaller prints, among them two thousand University Prints, illustrating Greek and Roman sculpture, and the art of Italy, Germany, and the Netherlands.

### Subjects.

II. Pencil Drawing from Objects.—*One laboratory credit per week, first term. Required of Freshmen in Agriculture. One laboratory credit per week, throughout the year. Required of Freshmen in Applied Science and Home Economics. Five laboratory credits per week, first term. Elective for Freshmen.*

III. History of Art.—*Two recitation credits per week, second term. Required of Juniors in Home Economics. Two recitation credits per week, first term. Required of Seniors in Home Economics.*

IV. Color Problems.—*One laboratory credit per week, first term. Required of Sophomores in Home Economics.*

V. Drawing in Charcoal from Still Life and the Cast.—*Two laboratory credits per week, second term. Elective.*

VI. Pen-and-ink Drawing, Water-Color, or Pastel.—*Two laboratory credits per week, second term. Elective.*

VII. Modeling.—*Two laboratory credits per week, second term. Elective.*

VIII. Work Illustrating Home Economics VII.—*One laboratory credit, second term. Required of Juniors in Home Economics.*

## Economic and Social Science.

PRESIDENT EDWARDS.

### Subjects.

I. Political Economy.—Text-book, supplemented by lectures, readings, and essays. *Four recitation credits per week, first term, first twelve weeks. Required of Seniors in all courses.*

II. Agricultural Economics.—The study of agriculture as an industry, from the point of view of political economy. Includes a study of the agricultural market; transportation of agricultural products; agricultural labor; farm ownership and tenancy; mortgages, etc. *Elective.*

III. Rural Sociology.—Movements of the farm population—causes and results; general social conditions of farmer, such as illiteracy, health, crime, etc.; personal and social traits developed by rural life; means of communication in rural communities; the rural school; agricultural education; the country church; farmers' organizations; federation of rural social forces. *Elective.*

## Home Economics.

PROFESSOR THOMPSON.

The aim of this department is to give both theoretical and practical training in the economic administration of the home. The laboratory is situated in a building by itself, which is finished and furnished in such a manner as to demonstrate the sanitary principles involved in proper kitchen arrangements. It is amply equipped with the most recent scientific cooking-apparatus, inclusive of thermometers, metric scales, different kinds of stoves, and individual utensils. The work in chemistry, biology, etc., is, however, carried on in the laboratories of those departments. There is a good home economics library, and students are expected to make intelligent use of the main library in reference work, as well as to study those bulletins of the Department of Agriculture and such state reports as deal particularly with the subjects of food and nutrition.

### Subjects.

I. Domestic Art.—A course in hand sewing; different kinds and combinations of stitches; drafting and cutting of patterns; machine practice; study of charts and tailoring systems; making of two undergarments and an unlined dress. *One laboratory credit per week, first term; and two laboratory credits per week, second term. Required of Freshmen in Home Economics.*

II. Elementary Cookery.—The economic use of fuels; the management of stoves and ranges; the study of cooking temperatures and processes; the care of utensils; practice in the cookery of a few typical foods. *One recitation and one laboratory credit per week, second term. Required of Freshmen in Home Economics.*

III a. Personal Hygiene.—This course considers the aim of personal hygiene as the maintaining of the most efficient human machine for the life needs of the individual. It endeavors to give and establish ideals of health and efficiency. *One recitation credit per week, first term. Required of all women Freshmen.*

III b. Euthenics.—The following topics are considered: environment of human life; problems of adaptation to modern conditions and progress; personal aim; individual responsibility; factors in human efficiency. *One recitation credit per week, second term. Required of all women Freshmen.*

IV. Foods.—A systematic study is made of the food constitutents, their sources, chemical composition, properties, nutritive and economic values. This course is accompanied by laboratory practice in the preparaion of many representative foods. Class demonstrations are given from time to time. *Three recitation and one-half laboratory credits per week, first term; two recitation and one and one-half laboratory credits per week, second term. Required of Sophomores in Home Economics. Prerequisites: Chemistry I, II, Home Economics II.*

V. Household Methods and Management.—Lectures and discussions upon general housework, the principles of laundering, marketing, apportionment of income, maintenance of standards, household administration, social, legal, industrial, and educational problems of the family. *Two recitation credits per week, first term. Required of Sophomores in Home Economics.*

VI. Human Nutrition.—Composition of the anmial body and its daily food requirements; methods of investigation employed in studying the nutritive function of foods; the changes effected by cooking and by the processes of digestion; balancing of dietaries; food economy. *Three recitation credits per week, first term. Required of Juniors in Home Economics. Prerequisites: Chemistry IV, Zoology III, Home Economics II, IV.*

VII. Home Decoration.—A study of the evolution of the house; its adaptation to modern conditions; the principles to be followed in planning, furnishing, and decorating the house from a sanitary and artistic standpoint. *Two recitation credits per week, first term. Required of Juniors in Home Economics.*

VIII. Dietetics.—Problems in nutritive ratios; the balanced dietary; hygienic combinations of foods; construction of menus; adaptation of the diet to age, occupation, and different climatic conditions. *One recitation and one laboratory credit per week, second term. Required of Juniors in Home Economics. Prerequisite: Home Economics VI.*

IX. Sanitation.—This course deals with household and public hygiene. Study of soils and drainage; house construction; heating, lighting, ventilation, and plumbing; water supply, sewage disposal, food infection. *Two recitation credits per week, second term. Required of Juniors in Home Economics. Prerequisites: Chemistry I, II, Botany I, Physics I.*

X. Food Preservation.—Study of the processes of decomposition, fermentation, and putrefaction; practice in preserving foods by drying, salting, and sterilization; preparation of jelly, pickles, and canned fruits; discussion of commercial preservatives. *One laboratory credit per week, first term. Required of Seniors in Home Economics. Prerequisite: Home Economics IX.*

XI. Hygiene and Care of Children.—A study of the physical development of children; care of infants and young children; school hygiene. *Two recitation credits per week, first term. Required of Seniors in* Home *Economics. Prerequisite: Psychology. Open to Juniors and Seniors in other courses.*

XII. Home Nursing.—Care of the sickroom and patient; administration of medicines; recording of symptoms; accidents and emergencies; hygiene of infectious diseases; antiseptics and disinfectants. *Two recitation credits per week, second term. Required of Seniors in Home Economics. Prerequisite: Home Economics IX.*

XIII. Therapeutic Cookery.—This course includes the study of abnormal conditions of digestion and metabolism, relation of food to specific diseases, cookery for the sick and convalescent. *One recitation and one laboratory credit per week, second term. Required of Seniors in Home Economics. Prerequisites: Home Economics IV, VI, VIII, X.*

XIV. Assigned Work.—This may be a problem in the biological, chemical, physiological, or economic aspect of the work in Home Economics. *Three recitation and two laboratory credits per week, second term. Required of Seniors in Home Economics.*

XV. Teaching of Home Economics.—Purpose and method of the work; courses of study, equipment, etc. *One recitation credit per week, second term. Elective for Seniors in Home Economics.*

XVI. History of Home Economics.—Development of home economics movement; a study of the work as presented in different types of institutions, and its industrial, educational, and sociologic aspects. *One recitation credit per week, first term. Elective.*

XVII. Textiles.—A study of fabrics; processes and appliances studied with reference to their historic development; primitive industries; modern processes of manufacture; dyeing, spinning, and weaving. *Two recitation credits per week, second term. Elective. Prerequisite: History I, Home Economics I.*

XVIII. Dressmaking and Tailoring.—*Three laboratory credits per week, second term. Elective for students who have completed Home Economics* I.

XIX. Food Products.—Production, manufacture, and marketing of foods; factors affecting cost. *Two recitation credits per week, first term. Elective.*

XX. A Study of the Family.—Development of the domestic institutions; social ethics of the family; legal, industrial, and educational problems of the household. *Two recitation credits per week, second term. Prerequisite: Home Economics V. Elective.*

## DOMESTIC SCIENCE.

A. Household Technique.—This course is planned to give a knowledge of the processes involved in household work. It deals with the handwork of cooking and cleaning; care of rooms, table setting and serving, etc. *Two recitation credits per week, first term, first year. Required of Short-Course students in Domestic Science.*

B. Sewing.—Hand sewing; use of machine; drafting of patterns. *One laboratory credit, first term, first year. Required of Short-Course students in Domestic Science.*

C. Foods.—Study of the five food principles and their nutritive and physiological functions; practice in the cookery of vegetables, cereals, fruits, milk, eggs, and meats. *Three recitation and one and one-half laboratory credits per week, second term, first year. Required of Short-Course students in Domestic Science.*

D. Dietetics.—Provides instruction in advanced cooking; special cooking for sick and convalescent; plannng of meals; discusses food for different ages and conditions. *Three recitation and one and one-half laboratory credits per week, first term, second year. Required of Short-Course students in Domestic Science.*

E. Management of the House.—Considers the materials, qualities, amounts, and cost of house furnishing and supplies; lessons in marketing. *One recitation credit, second term, second year. Required of Short-Course students in Domestic Science.*

F. Hygiene.—Study of the living machine, its mechanism and functions; the right use and proper care of the human mechanism; home nursing and emergencies. *One recitation credit per week, second term, second year. Required of Short-Course students in Domestic Science.*

G. Textiles.—Study of the clothing fabrics; dressmaking. *One and one-half laboratory credits per week, second term, second year. Required of Short-Course students in Domestic Science.*

## Psychology and Education.

DR. SECHRIST, ASSISTANT PROFESSOR SPENCER.

I. History of Education.—Study of educational theory and practice from the historical point of view with special reference to modern scientific and industrial education. *Three recitation credits per week, first term. Required of Seniors in Applied Science and Home Economics.*

II. Psychological Principles of Education.—Study of the principles of teaching from the psychological point of veiew. *Two recitation credits per week, first term. Required of Seniors in Applied Science. Prerequisite: Psychology.*

III. Secondary Education.—Principles of teaching, with special reference to the aims of the secondary school; organization, management, and method in the high school. *Two recitation credits per week, second term. Required of Seniors in Applied Science. Prerequisite: Psychology and Education II and IV.*

IV. Psychology.—Structure and functions of mental life. Study of text-book is supplemented with experiments and with lectures on the practical applications of psychology. *Three recitation credits per week, first term. Required of Juniors in Applied Science and Home Economics.*

V. Ethics.—Study of ethical principles, with special reference to the problems of individual and social life. *Two recitation credits per week, second term. Elective for Seniors in Home Economics.*

VI. Esthetics.—Study of esthetic principles from the psychological point of view. *Two recitation credits per week, second term. Elective for Seniors in Home Economics. Prerequisite: Psychology and Education IV.*

VII. Sociology.—Text-book work and assigned readings. *Three recitation credits per week, second term. Required of Seniors in Home Economics.*

## Mechanical Engineering.

PROFESSOR WALES, MR. ELDRED, MR. EAMES, MR. PEASLEE.

It is the object of the work in the department of mechanical engineering to turn out broad-gauged, self-dependent men, well trained in engineering theory, familiar with the practical matters of construction and operation, and having some knowledge of the economic relations which the engineer and industrial development bear to modern society. In the endeavor to train men who will touch life, not at one point, but at many, the work of the department is supplemented and rounded out by extended and vigorous courses along the lines of electrical engineering, physics, mathematics, chemistry, English, history, modern languages, and political economy. The special work of the department of mechanical engineering divides itself naturally into the following general groups: shop practice, design, steam engineering, and experimental engineering. Each of the above groups is amplified and briefly described below:

### SHOP PRACTICE.

The object of this work is to give familiarity with principles, operations, possibilities, and management, rather than to develop the greatest dexterity in manipulation. Shop practice extends over three years of the course, and comprises forging and foundry work, pattern making, and machine-tool operation. The shops are exceptionally well equipped with machines and tools of all kinds. In the machine shop are six metal lathes, speed lathes, planes, 16-in. shaper, two drills, two tool grinders, drill grinder, milling machine, punching-press, vertical boring and turning mill, together with the usual assortment of tools and auxiliaries. The pattern shop is provided with lathes, circular saw, band saw, jig saw, dowel machine, surface and buzz planers, etc. Fifteen work-benches fully provided with the small tools of the pattern maker complete the equipment. The forge shop is equipped with the usual anvils, forges, fullers, swages, hardies, etc., while a full stock of patterns, shovels, riddles, flasks, and trowels is provided for the work in foundry practice. Enthusiasm is given to the work by the construction of things of real value—a new machine for the shop, or a piece of apparatus for the laboratory—instead of spending the whole time on worthless "exercises."

## DESIGN.

The work along the lines of design extends throughout the four years, beginning with freehand and mechanical drawing and ending with machine design and power-plant design in the Senior year. Leading up to this final work are the terms of mechanical drawing, descriptive geometry, mechanism, valve gears, dynamics of machines, mechanics, strength of materials, hydraulics, and thermo-dynamics. All the forces of correct theory and the practice of the most successful builders are brought to bear upon the solution of definite, practical problems.

## STEAM ENGINEERING.

Steam engineering begins in the Junior year and runs through the remainder of the course. A rigorous study of the mathematical theory of thermo-dynamics supplies the foundation for the study of boilers and engines, design and economy, and the various devices and auxiliaries of the power plant. In the Senior year is considered the particular branch of heating and ventilating. In this year, also, the subject of power plants is taken up, which applies all the previous training in steam engineering, and which brings together and unifies all allied subjects.

## EXPERIMENTAL ENGINEERING.

This subject, which extends throughout the Junior and Senior years, is intended to fix the theory developed in all the other lines of work. Instruction is given by means of lectures and laboratory tests. The student becomes familiar with the theory, construction, use, and calibration of the instruments and apparatus used by the engineer, and gains experience in making accurate standard and special tests. The work is divided into four groups: one dealing with the chemical problems of engineering—testing of gases, oils, fuels, feed water, etc.; a second, with general calibration and testing; a third, with the study and tests of structural materials; and the fourth, with general power-plant testing. In power-plant testing the students make the necessary plans and preparations, perform the experimental work, and prepare formal reports, with recommendations for improvement in economy, etc. These tests are made not only on the college power-plants, but on those of manufacturing establishments of the state. The equipment for experimental work comprises several boilers and steam engines, large steam pump, hot-air engine, gas engine, feed-water heaters, several steam and gas engine indicators, steam calorimeters, tanks, scales, injectors, water turbine, hydraulic ram, meters, gauges, 50,000-lb. tension and compression machine, apparatus for oil and gas testing, fuel calorimeter, complete outfit for testing cements and concretes, etc. Throughout the work the greatest stress is laid upon the correct calculation and interpretation of results, and accuracy and self-dependence are developed to the fullest.

## Subjects.

I. Mechanical Drawing.—Lettering, freehand sketching, use of drafting tools, geometrical problems, projections, machine parts. *Three laboratory credits per week, first term; two laboratory credits per week, second term. Required of Freshmen in Engineering. One and one-half laboratory credits per week, first term. Required of Juniors in Home Economics.* Mr. Eames.

II. Forge and Foundry.—Forging, drawing, bending, welding, etc. Principles of moulding, core making, and casting. *Three laboratory credits per week, first term. Required of Freshmen in Engineering and Short-Course students in Engineering, first year.* Mr. Eldred.

III. Pattern Making.—Use of tools, bench and lathe work, pattern making. *Three laboratory credits per week, second term. Required of Freshmen in Engineering and Short-Course students in Engineering, first year.* Mr. Eldred.

IV. Graphic Statics.—Force and funicula polygons with applications in the determination of stresses in framed structures. *Two recitation credits per week, second term. Required of all Sophomores in Engineering.* Mr. Eames.

V. Descriptive Geometry.—Elementary principles; problems relating to the point, line, plane, cylinder and double curved surfaces of revolution, intersections, and developments. *One recitation and two laboratory credits per week, first term. Required of all Sophomores in Engineering.* Mr. Eames.

VI. Mechanical Drawing.—Detail and assembly drawings, elementary machine design. *Three laboratory credits per week, second term. Required of Sophomores in Mechanical, Electrical, and Civil Engineering.* Mr. Eames.

VII. Machine Shop.—Hand work in chipping and filing, use of machine tools, construction of machines. *Three laboratory credits per week, second term. Required of Sophomores in Mechanical and Electrical Engineering. Three laboratory credits per week, throughout the year. Required of Short-Course students in Engineering, first year. One and one-half laboratory credits per week, second term. Required of Sophomores in Civil Engineering.* Mr. Eldred.

IX. Heat Engineering—Thermo-dynamics.—Mathematical development and discussion of the laws of thermo-dynamics, and their application to perfect gases, saturated and superheated steam. Theory of air compressors, pneumatic machinery, hot-air engines, gas engines, and refrigerating machines. Boilers, engines, engine economy, effect of cylinder walls, compounding, superheating, use of jackets, varying cut-off, speed, pressure, etc. Flow of fluids, injectors, and thermo-dynamic principles applied to the steam turbine. *Three recitation credits per week, throughout the year. Required of Juniors in Mechanical and Electrical Engineering; and for twenty-seven weeks, of Juniors in Chemical Engineering.* Professor Wales.

X. Applied Mechanics.—Forces, composition and resolution, parallel forces, moments, couples, centres of gravity, velocity, acceleration, energy and momentum, falling bodies and projectiles, centrifugal force, moment of inertia, radius of gyration, angular momentum, energy of rotating bodies, impact, etc. Strength of material, stresses in structures, riveted joints, beam theory, struts, columns, shafting, springs, etc. Solution of practical problems. Text, Lanza's Applied Mechanics. *Five recitation credits per week for twenty-four weeks. Required of Juniors in Mechanical, Electrical, and Civil Engineering, and of Juniors in Chemical Engineering for the first term.* Professor Wales.

XI. Hydraulics.—General principles, head and pressure, center of pressure, velocity of discharge, flow through orifices and over weirs, Bernouilli's theorem, flow through pipes, flow through conduits and canals, energy of flow, horse-powers, hydraulic machinery, rams, turbines, centrifugal pumps, and Pelton wheels. Merriman's Treatise on Hydraulics. *Five recitation credits per week, for last twelve weeks of second term. Required of Juniors in Mechanical, Electrical, and Civil Engineering.* Professor Wales.

XII. Mechanism.—Instantaneous centers, centroids, lobed wheels, belts, pulleys, four-bar linkages, graphical determination of velocity ratios, quick-return motions, straight-line motions, pantographs, trains of gears, epicyclic trains, tooth gearing, epicycloidal and involute teeth, bevel wheels, etc. Schwamb and Merrill's Mechanism. *Three recitation credits per week, first term. Required of Juniors in Mechanical and Seniors in Chemical Engineering.* Mr. Eames.

XIII. Valve Gears and Dynamics.—Plane slide valves, piston valves, riding cut-off valves; Joy and Marshall gears; Stephenson, Gooch, and Walscheart link motions; drop cut-off valves; Corliss, Brown, and Putnam valves; Peabody's Valve Gears. Lectures and references. *Three recitation credits per week, second term. Required of Juniors in Mechanical Engineering.* Mr. Eames.

XIV. Machine Shop (continuation of subject VII.) —Advanced work in machine consruction. *Three laboratory credits per week, throughout the year. Required of Juniors in Mechanical Engineering, and Short-Course students in Engineering, second year.* Mr Eldred.

XV. Experimental Engineering a.—Lectures and laboratory work in gases, oils, and fuels; flue-gas analysis, calculation of air per pound of coal, loss due to excess air and to imperfect combustion; analysis of fuel gases and calculation of heating values; determination of heating values by the Junkers and Parr calorimeters; study of gases in producer and gas-engine work. *Two laboratory credits, first term. Required of Juniors in Mechanical and Electrical Engineering, and Seniors in Chemical Engineering.* Professor Wales.

XVI. Experimental Engineering b.—General calibration and testing of engineering instruments and apparatus; guages; planimeter; manometers; indicators; Prony brakes; scales; valve setting by measurement and by the indicator; Carpenter calorimeter; Peabody calorimeter; flow through orifices; weirs; nozzles; Pitot tube; meters; Venturi meters; hydraulic ram; turbine, etc. *Two laboratory credits per week, second term. Required of Juniors in Mechanical, Electrical, and Civil Engineering.* Professor Wales and Mr. Eames.

XVII. Experimental Engineering c.—Properties of materials. Lectures on the metallurgy of iron and steel; effects of impurities; cold-working; repeated stresses; tensile, compressive, and shearing strengths; ductility; resilience, etc.; copper, brass, bronze, and other alloys; timber, stone, and brick. The manufacture of natural and Portland cements; effects of over- and under-burning, overliming, $SO_3$, etc.; discussion of tests and their interpretation. Laboratory work is parallel with lectures. Tensile strengths of cast-iron, wrought-iron, and steel; compressive strength of metals, timber, concrete, cement; shearing tests of metals; transverse tests of timber and iron; stress-strain diagram, elastic limit, yield point, modulus of rupture; tensile tests of cement; pat tests, boiling tests; specific gravity; fineness; time of set, etc. Determination of the best proportions of cement, sand, and rock of given characteristics. *Two lectures and two laboratory credits per week, first term. Required of Seniors in Mechanical, Electrical, and Civil Engineering.* Professor Wales and Mr. Eames.

XVIII. Experimental Engineering d.—Hot-air engine, gas engine, steam pump, injectors, transmission dynamometers; boiler tests; complete tests of power plants; outside work on the H. P. of a stream, with tests of hydraulic power plant; outside tests of manufacturing plants, with calculations, reports, and recommendations. *Two laboratory credits per week, second term. Required of Seniors in Mechanical Engineering.* Professor Wales.

XIX. Heating and Ventilation.—Discussion of the principles and practice of the various systems of heating and ventilating—direct and indirect, hot-air, hot-water, pressure steam, exhaust steam, vaccuum systems, fans, blowers; calculation of ventilation and radiation; flues, pipes, and radiators; air troubles; central heating systems with central power plants; design of heating system for a given building. *One recitation credit per week, second term. Required of Seniors in Mechanical Engineering.* Professor Wales.

XX. Machine Design.—Design of machine parts from considerations of the motions involved, strength, rigidity, and friction; design of a complete machines calculations with design of some type of engine, starting with given requirement; of H. P., speed, etc., and with an assumed theoretical indicator card. *Three laboratory credits per week throughout the year. Required of Seniors in Mechanical Engineering.* Mr. Eames.

XXI. Power Plants and Power-Plant Design.—Study of the various types—as to choice, location, installation, and operation; prime movers, their accessories and auxiliaries.

Steam Plants.—Study of the effects on economy, range, and reliability of simple or compound, condensing or non-condensing engines with various valve gears, throttling and cut-off governors, different boiler installations, feed-water heaters, economizers, pressure regulators, pumps, injectors, mechanical stokers, forced and induced draft, chimneys, etc.; calculations of proper sizes, powers, and strengths of machines and apparatus of the power plant; methods of improving economy. The place of the steam turbine in power-plant work.

Hydro Plants. Discussion of the types of hydraulic machinery, their efficiency, and the particular conditions to which each is best adapted. This will be a development of the previous work in hydraulics to meet the need of the power engineer.

Gas-Producer Plants.—The different suction and pressure producers, theory, capacity, future, etc.; gas engines, from both the thermo-dynamic and the mechanical points of view. *Two lecture credits and one laboratory credit per week, first term. Required of Seniors in Mechanical Engineering. Two lecture credits per week, first term. Required of Seniors in Electrical Engineering.* Professor Wales.

XXII. Assigned Work.—This may be of the nature of research or of specialized study along some particular line of engineering. Options are offered in theory of elasticity, advanced hydraulics, etc. *Three credits per week, throughout the year. Required of Seniors in Mechanical Engineering.*

XXIII. Dynamics of Machines.—Analysis of stresses, effects of inertia, balance, reciprocating parts, flywheels, design of high-speed engines and machinery. *Two recitation credits per week, second term. Required of Seniors in Mechanical Engineering.* Professor Wales.

XXIV. Works Management.—The economics of the shop and factory, cost-keeping, efficiency in production. *One lecture credit per week, second term. Required of Seniors in Mechanical Engineering.* Professor Wales.

XXV. Elements of Thermo-dynamics.—A non-mathematical discussion of boilers, engines, pumps, and power apparatus for civil engineers. *Three recitation credits per week, first term. Required of Juniors in Civil Engineering.* Mr. Eames.

A. Mechanical Drawing.—Lettering, sketching, use of drafting tools, projection drawing, representation of machine parts. *Three laboratory credits per week, throughout the year. Required of Short-Course students in Engineering, first year.* Mr. Peaslee.

B. Mechanical Drawing.—Detail and assembly drawing, elementary machine design. *Three laboratory credtis per week, throughout the year. Required of Short-Course students in Engineering, second year.* Mr. Peaslee.

D. Mechanical Movements.—Belts, pulleys, gearing, screw gearing, differential screws, tackles, hoists, hydraulic jacks, inclined planes, differential pulleys, pumps, crank and rocker, sliding and swinging block mechanisms, shafts, hangers, etc., cams and their design. *Three recitation credits per week, throughout the year. Required of Short-Course students in Engineering, first year.*

E. Engineering Theory.—An elementary discussion of types of engines, valve gears, governors, etc., boilers, types, corrosion and incrustation, combustion, methods of firing, draft, safety valves, boiler H. P. testing; lubricants and lubrication; gas engines; elementary study of materials; practical electricity. *Five recitation credits per week, throughout the year. Required of Short-Course stuents in Engineering, second year.*

F. Applied Electricity.—Elementary theory, wiring, motors, dynamos, etc. *One recitation credit and two laboratory credits per week, throughout the year. Option for Short-Course students in Engineering.*

## Electrical Engineering.

PROFESSOR DICKINSON, MR. CLOKE, MR. PEASLEE.

The aim of the course in electrical engineering is to give the student such training in the fundamental principles of the subject as will fit him to take up, in an intelligent and effective manner, any line of engineering work requiring special electrical knowledge. Instruction is given in both classroom and laboratory, the aim of each method of instruction being to supplement the other, and to develop resourcefulness and the habit of independent thought on the part of the student.

### Subjects.

I. Theory of Direct Currents.—A detailed study of the theory of direct-current apparatus. The theory of dynamos, motors, and auxiliary apparatus. *Three recitation credits per week, first term. Required of Juniors in Electrical Engineering and of Seniors in Mechanical and Civil Engineering.* Mr. Cloke.

II. Direct-Current Laboratory.—A course following Physics V, and consisting of tests of various types of direct-current apparatus. These include magnetization and characteristic curves of different types of machines, as well as tests for efficiency, regulation, temperature rise, and tests of a similar nature. *Three laboratory credits per week, second term. Required of Juniors in Electrical Engineering and of Seniors in Mechanical Engineering.* Mr. Cloke.

III. Electrical Measurements.—A course designed to familiarize the student with physical and electrical units, fundamental and derived; the electrical standards of E. M. F., current, and resistance; and with the methods employed in the simpler electrical measurements. *One recitation credit per week for last nine weeks, second term. Required of Sophomores in Electrical Engineering.* Mr. Cloke.

IV. Theory of Alternating Currents.—Recitations and lectures. The elements of the theory of alternating currents and of alternating-current machinery. This course includes the simpler theories regarding the action of A. C. dynamos, motors, converters, and transformers. *Two recitation credits per week, second term. Required of Juniors in Electrical Engineering and of Seniors in Mechanical Engineering.* Professor Dickinson.

V. Theory of Alternating Currents.—Recitations and lectures, continuing subject IV. The more advanced theories regarding the effect of inductance and capacity in A. C. circuits, and of the action of A. C. machinery, are discussed. Assigned readings and reports are a feature of the subject. *Three recitation credits per week, throughout the year. Required of Seniors in Electrical Engineering.* Professor Dickinson.

VI. Alternating-Current Laboratory.—A course following Physics VII, consisting of tests of different types of alternating-current apparatus, such as single and polyphase generators and motors, induction motors, converters, and transformers. *Three laboratory credits per week, throughout the year. Required of Seniors in Electrical Engineering.* Professor Dickinson.

VII. Design of Electrical Machinery.—General principles of the design of electrical apparatus, including a direct and an alternating current generator. *Three laboratory credits per week, second term. Required of Seniors in Electrical Engineering.* Professor Dickinson.

VIII. Telephone Engineering.—A consideration of the development of the modern telephone, with special reference to the common battery systems. *One recitation credit per week, first term. Required of Seniors in Electrical Engineering.* Mr. Peaslee.

X. Transmission of Energy.—A study of systems of high-tension distribution, the effect of capacity and inductance, the construction of lines, their protection, and the troubles developing in high-tension work. *Two recitation credits per week, first term. Required of Seniors in Electrical Engineering.* Professor Dickinson.

XI. Electric Railway Engineering.—A discussion of the economic considerations in the development of an electric railway, methods of construction, the location of the generating station, the design of the distributing system, types of motors, and systems of control. *Two recitation credits per week, second term. Required of Seniors in Electrical Engineering.* Mr. Cloke.

XII. Assigned Work. Thesis work is assigned to those Seniors possessing special aptitude for original research. Other students are assigned special work in the laboratories of the department. *Three laboratory credits per week, throughout the year.* Professor Dickinson.

## Civil Engineering.

PROFESSOR WEBSTER, MR BILLS.

It is the purpose of this course to give the student such training in the fundamental principles of engineering as so prepare him for the duties and opportunities that may be offered in the various fields of civil engineering. With this object in view, application of the theories and principles learned in the classroom is made in the field, laboratory, and drafting-room. An effort is also made to give the student as liberal a training in the sciences and arts as his limited time will permit, but the primary purpose is to prepare him for one definite line of work.

In order to widen the scope of the student's opportunities, the name of the department has been changed from Highway Engineering to Civil Engineering, and corresponding changes have been made in the course of study. However, owing to the growing importance of highway engineering in this state and throughout the country in general, considerable emphasis is still placed on this phase of engineering work. The state appropriates annually a sum of money, which is expended under the direction of the instructor and students of the department, in the construction and maintenance of roads on the college property. In this way practical experience is obtained in highway engineering.

The equipment of the department consists of levels, transits, compasses, rods, tapes, chains, drafting instruments, etc., and testing machines, to which the student has access. He also has free use of the library, in which are found the leading engineering journals, and many of the principal works on various engineering subjects.

## Subjects.

I. Surveying.—Instruction is given by means of recitations, field and laboratory work, in the theory, use, and adjustments of the compass, level, and transit. The field work includes the prolongation of straight lines, determination of distances, angles, areas, boundaries, corners, and exercises in leveling, etc. Maps are made from the field notes. *One recitation and two field credits per week, first term. Required of Sophomores in Mechanical, Electrical, and Civil Engineering.*

II. Topographic Surveying.—A study is made of the theory and use of the plane table, and of the transit and stadia in making topographic surveys. A complete topographic survey based on a system of triangulation is made, including the completion of a map. *One recitation and two field credits per week, second term. Required of Sophomores in Civil Engineering.*

III a. Railroad Engineering.—The work consists of a reconnoissance, a preliminary and a location survey of a short line of railroad, for the purpose of giving the student sufficient work to familiarize him with the methods in actual practice. A set of notes is kept by each student, from which a map, a profile, and estimates are made. A study is also made of the properties of curves, switches, frogs, turnouts, and the spiral, and the methods of locating these in the field. *Five credits per week, divided between field and recitation as seems advisable, first term. Required of Juniors in Civil Engineering.*

III b. Railroad Engineering.—The principles of economic railroad construction and maintenance; railway appliances, ballast, and roadbed, culverts and trestles, turnouts, sidings, yards, terminals, signaling, locomotive and grade problems, betterment surveys, etc. *Three recitation credits per week, second term. Required of Juniors in Civil Engineering.*

IV. Graphic Statics.—Instruction is given in graphic statics and its application in the design of simple framed structures. *Two recitation credits per week, first term. Required of Juniors in Civil Engineering.*

V. Roads and Pavements.—The theoretical work of this course consists of a discussion of the principles and details involved in the location, construction and maintenance of earth, gravel, and macadam roads, together with a discussion of the methods of construction, durability, maintenance, and assessment of cost of the various kinds of pavements used on city streets. The field work consists in the construction of a gravel or macadam road on the college grounds. *Three recitation credits and one field credit per week, second term. Required of Juniors in Civil Engineering.*

VI. Bridge Details.—The work in this course consists in making a tracing of a shop drawing, estimating the weight and determining the efficiency of the various members of a highway bridge. *Two laboratory credits per week, first term. Required of Seniors in Civil Engineering.*

VII. Bridge Analysis.—Instruction is given in the computation of stresses in the various types of bridges by graphical and algebraic methods under different conditions of loading. *Two recitations credits per week, first term. Required of Seniors in Civil Engineering.*

VIII. Bridge Design.—The student designs a plate girder and a bridge, makes the shop details, and a set of working drawings. *Three laboratory credits per week, second term. Required of Seniors in Civil Engineering.*

IX. Masonry Construction.—This course deals with the materials of masonry, including brick, stone, lime, and cement; the theory of masonry structures, including foundations for buildings, bridges, and piers; the construction of retaining walls, culverts, bridge abutments; masonry dams and arches. The student is directed to important articles in the current literature of the subject, and a systematic and thorough laboratory course on cement testing is given. *Two recitation credits and one laboratory credit per week, first term. Required of Seniors in Civil Engineering.*

X. Reinforced Concrete.—A study is made of the principles of mechanics underlying the design of reinforced concrete. Working stresses and economical proportions are considered, also the application of reinforced concrete construction to building construction, arches, retaining walls, dams and miscellaneous structures. *Two recitation credits per week, second term. Required of Seniors in Civil Engineering.*

XI. Sewerage.—A discussion of the separate and combined systems of sewers; relation of rainfall to storm-water flow; hydraulics of sewers; removal of house sewage; the design and construction of sewers and method of sewage disposal. *Two recitation credits per week, first term. Required of Seniors in Civil Engineering.*

XII. Water Supply.—A discussion of the quantity of water required, sources of supply, flow of streams, and of ground water. Instruction is also given in the general arrangement of waterworks, loss of head in flow of water through pipes, stresses in dams and water towers. Works for the purification and distribution of water are discussed, including reservoirs, settling basins, pumping machinery, etc. *Three recitation credits per week, second term. Required of Seniors in Civil Engineering.*

XIII. Tunneling.—A study of the methods of making tunnel surveys and of the modern methods employed in tunnel construction. *One recitation credit per week, second term. Required of Seniors in Civil Engineering.*

XIV. Contracts and Specifications.—A study of the fundamental principles of the law of contracts, and their application to engineering work. *Two recitation credits per week, second term. Required of Seniors in Civil Engineering.*

XV. Assigned Work.—With the advice and consent of the head of the department, the student elects three hours' work in the the Senior year. This may be research, thesis, or recitation and laboratory work, depending upon the qualifications of the student. *Three credits per week, throughout the year. Required of Seniors in Civil Engineering.*

XVI. Vacation Reading.—Systematic reading during vacations on some topic assigned by the head of this department.

XVII. Metal Structures.—The graphical determination of stresses in steel mill buildings. *One laboratory credit per week, second term. Elective for Seniors in Civil Engineering.*

XVIII. Irrigation Engineering.—This includes a study of the impounding, diverting, flow, and measurement of water, quantity acquired, canals, canal works, storage reservoirs, wasteways, etc. *Three recitation credits per week, first term. Elective for Seniors in Civil Engineering.*

## Geology and Mineralogy.

DR. WHEELER, DR. LEIGHTON, MR. SMITH.

Geology.—Under this subject historical geology is considered in outline, attention being given, also, to those phases of dynamical and structural geology which are particularly important. Special attention is given to rock weathering and soil formation, and to those characteristics of rocks which are of chief importance in connection with road construction.

Determinative Mineralogy.—A short course dealing with the elements of crystallography is given, together with the physical and chemical characteristics of minerals, especially of the rock-making minerals composing our soils. Laboratory work in blowpipe analysis and physical determination of minerals follows the crystallography.

### Subjects.

I. Geology.—*Two recitation credits per week, second term. Required of Juniors in Civil Engineering and Sophomores in Agriculture.*

II. Mineralogy.—See Chemistry XI.

## History.

PRESIDENT EDWARDS, ASSISTANT PROFESSOR SPENCER.

I. Social, Economic, and Industrial History of the United States.—*Four recitation credits per week, second term. Required of Juniors in all courses.*

II. Government and Politics in the United States.—*Four recitation credits per week, first term, last six weeks; and second term, first six weeks. Required of Seniors in all courses.*

## English and Modern Languages.

DR. SECHRIST, ASSISTANT PROFESSOR SPENCER, MISS MYRICK, MRS. HADLEY.

In all the college courses leading to a degree, English is required throughout the first three years and during twelve weeks of the Senior year. The first two years, a study is made of the principles of clear thinking and effective expression as exemplified in modern literary and scientific prose; however, the greater part of the time is devoted to the writing of themes and to oral expression, special stress being laid on exposition and argument. In the later and more advanced stages of the work, a systematic study is made of literature as an art according to the principles of criticism, the controlling aim being to deepen the appreciation of poetry in its various forms and functions, in its ethical import and its philosophy.

Besides the work in English, two years of foreign language work are required in all college courses leading to a degree, except mechanical, electrical, and civil engineering, where the requirement is one year. Preference is given to German, but French is also offered.

The library is a most important factor in the work of the department, as the English language and literature are represented in it by some twelve hundred carefully selected volumes, and the French and German literatures by about six hundred.

### ENGLISH.

I. Rhetoric and Composition.—Studies in the method of modern prose with analysis of models of literary and logical form. Daily practice in the various forms of composition, special stress being laid on Exposition. *Three recitation credits per week, throughout the year. Required of Freshmen in all courses.*

II. Newspaper Work.—News writing, reporting, news values, proof-reading, editorials. *One recitation credit per week, first term. Required of Sophomores in all courses.*

III. Argumentation. Theory and Practice (in connection with Oral Exp. II); brief-drawing. *One recitation credit per week, second term. Required of Sophomores in all courses.*

IV. Principles of Criticism.—Study of literary method with especial reference to lyric and epic poetry. Interpretation of classic examples in each form. *Four recitation credits per week, first term. Required of Juniors in all courses.*

V. The Drama. — The great character types of dramatic literature with Shakespearean tragedy as the central study. *Four recitation credits per week, last twelve weeks of the second term. Required of Seniors in all courses.*

VI. Composition.—Oral and written, in kind and amount according to individual need. *Not less than two recitation credits per week, last twelve weeks, first term; second term. Elective for Freshmen.*

A. Elementary English.—Composition, oral expression, assigned reading. *Five recitation credits, throughout the year. Required of Short-Course students in Agriculture, Domestic Science, and Engineering, first year.*

B. Elementary English.—A continuation of A, including, also, some instruction in civics and economics. *Three recitation credits, throughout the year. Required of Short-Course students in Domestic Science and Engineering, second year.*

## ORAL EXPRESSION.

I. Interpretive Reading.—The fundamentals of expression, pronunciation, articulation, the training of the voice. The intellectual element in expression: emphasis, inflection, phrasing—the reading of prose. The emotional element in expression: quality, force, pitch, rhythm—the reading of poetry. The elements of dramatic expression. *One recitation credit per week, first term. Required of Sophomores in all courses.*

II. Debating. — The theory of the subject with oral practice; taken with Argumentation (English III). *One recitation credit per week, second term. Required of Sophomores in all courses.*

III. Debating.—Instruction and practice in the art of debate. Two public debates will be given by the students. *One recitation credit per week, throughout the year. Required of Juniors in all courses.*

IV. Oratory and Extempore Speaking. — Theory and practice. This work is given in connection with the subjects of Government, Political Economy, and English V. *One recitation credit per week, throughout the year. Required of Seniors in all courses.*

## GERMAN.

I. Elementary German.—Grammar, dictation, conversation, reading of easy prose and poetry. *Three recitation credits per week, throughout the year. Required of Freshmen who do not offer German for entrance.*

II. Reading of texts portraying German life and institutions, composition, conversation. *Three recitation credits per week, throughout the year. Required of Sophomores in Agriculture, Applied Science, Home Economics, and Chemical Engineering.*

III. Scientific German.—*Three recitation credits per week, throughout the year. Elective for students who have taken I and II or their equivalents.*

IV. Scientific German.—*From three to five recitation credits per week, first term; Freshman year. Elective for Freshmen.*

### FRENCH.

I. Elementary French.—Grammar, dictation, conversation, reading of easy prose and poetry. *Three recitation credits per week, throughout the year.*

II. Reading of intermediate texts, composition, conversation, selections from Hugo's Les Misérables or similar work. *Three recitation credits per week, throughout the year.*

III. Scientific and Classical French.—*Three recitation credits per week throughout the year. Elective for students who have taken I and II or their equivalents.*

IV. Scientific French.—*From three to five recitation credits, first term; Freshman year. Elective for Freshmen.*

### SPANISH, ITALIAN.

I. Elementary Spanish or Italian.—*Three recitation credits per week, first or second term. Elective.*

## Mathematics.

The work in this department covers two distinct phases of mathematical training: the college and the short-course instruction. Throughout the regular college work, emphasis is laid both on the theory and direct application of the different subjects to the problems of engineering and agriculture. An attempt is made to present a working knowledge of arithmetic, algebra, and bookkeeping, and their practical use to short-course students.

### Subjects.

I. Higher Algebra.—*Five recitation credits per week, nine weeks, first term. Required of all Freshmen.* Professor Tyler, Mr. Bills.

II. Trigonometry.—*Five recitation credits per week, nine weeks, first term. Required of all Freshmen.* Professor Tyler, Mr. Bills.

VII. Trigonometry (completed).—*Five recitation credits per week, first four weeks, second term. Required of Freshmen in Engineering and Applied Science.* Professor Tyler, Mr. Bills.

VIII. Analytics.—*Five recitation credits per week, last fourteen weeks, second term. Required of Freshmen in Engineering and Applied Science.* Professor Tyler, Mr. Bills.

IX. Analytics (completed).—*Five recitation credits per week, first four weeks, first term. Required of Sophomores in Engineering.* Professor Tyler.

X. Calculus.—*Five recitation credits per week, last fourteen weeks, first term Required of Sophomores in Engineering.* Professor Tyler.

XI. Calculus (completed).—*Five recitation credits per week, second term. Required of Sophomores in Engineering.* Professor Tyler.

XII. University Algebra.—*Three recitation credits per week, first term. Elective for Freshmen.*

XIII. Practical Computations.—*Three recitation credits per week, second term. Elective for Freshmen.*

F. Arithmetic.—*Five recitation credits per week, throughout the year. Required of students in the Short-Courses, first year.* Mr. Bills.

G. Bookkeeping.—*Four recitation credits per week, first term. Required of students in Short Courses, second year.* Mr. Bills.

H. Algebra.—*Five recitation credits per week, second term. Required of students in Short-Course Engineering, second year.* Mr. Bills.

## Military Science and Tactics.

LIEUTENANT STAHL.

All male students are required to attend exercises in military instruction during their attendance at the college, unless excused by reason of physical disability. Credit is given for this work on the same basis and under the same regulations as in other departments.

The war department furnishes for use in this instruction United States magazine rifles (Krag-Jorgensen pattern), swords, equipments, and ammunition for target practice. The cadets are organized this year into a battalion of two companies of infantry and band. Theoretical instruction is given by means of lectures and recitations, and practical instruction by means of infantry drills in the school of the squad, the company, and the battalion. The aim of these military exercises is to improve the physique, to inculcate the habit of prompt and cheerful obedience and courtesy to rightfully constituted authority, and to exercise an elevating influence on the conduct of the corps of cadets.

Competitive drills are held annually between the companies of the battalion. The name of the best drilled company and its commander is placed on the battalion colors.

The names of such students of the graduating class each year as have shown special aptitude for military service will be reported to the adjutant-general of the army and also to the adjutant-general of the state.

## Subjects.

I. Practical Instruction.—Drills in the school of the squad, of the company, and of the battalion; target practice. *Two exercises of one hour each each per week, counting as one credit, throughout the year. Required of all the command.*

II. Theoretical Instruction.—United States Infantry Drill Regulations. Small Arms Firing Regulations. Manual of Guard Duty. Field Service Regulations of United States Army. *One recitation credit per week, throughout the year. Required of all Freshmen.*

## BATTALION ORGANIZATION, JANUARY 11, 1911.

COMMANDANT,

Henry G. Stahl, First Lieutenant, 6th U. S. Infantry.

### CADET OFFICERS AND NON-COMMISSIONED OFFICERS.

### *Battalion.*

| | |
|---|---|
| Major | D. E. Warner. |
| First Lieutenant and Adjutant | H. N. Barlow. |
| First Lieutenant and Quartermaster | C. R. Wade. |
| Sergeant-Major | R. W. Ruprecht. |
| Quartermaster Sergeant | W. J. Whalen. |

### *Company A.*

| | |
|---|---|
| Captain | A. J. Minor. |
| First Lieutenant | L. C. Easterbrooks. |
| Second Lieutenant | B. R. Robinson. |
| First Sergeant | H. A. Safford. |
| Sergeant | C. M. Bigelow. |
| Sergeant | J. F. Nugent. |
| Sergeant | A. J. Patterson. |
| Sergeant | E. A. Comber. |
| Corporal | E. G. Davis. |
| Corporal | E. A. Tyler. |
| Corporal | F. A. Richmond. |
| Corporal | R. C. Hopkins. |
| Corporal | W. C. Matthews. |

### *Company B.*

| | |
|---|---|
| Captain | B. K. Harris. |
| First Lieutenant | C. R. Gilchrest. |
| Second Lieutenant | P. J. Healy. |
| First Sergeant | R. W. Kent. |
| Sergeant | W. H. Tully. |
| Sergeant | W. Doll. |
| Sergeant | J. L. Sullivan. |
| Sergeant | H. L. Mounce. |
| Corporal | C. V. Johnson. |
| Corporal | F. H. Briden. |
| Corporal | J. H. Young. |
| Corporal | E. R. Noyes. |
| Corporal | R. I. Alexander. |

### *Band.*

| | |
|---|---|
| Chief Musician | H. B. Albro. |
| Principal Musician | C. P. Hart. |
| Drum Major | C. H. Larkin. |
| Sergeant | B. A. Ahrens. |
| Corporal | C. I. Goodchild. |

## Physics.

PROFESSOR DICKINSON, MR. CLOKE.

The instruction given in this department is intended to acquaint the students with the fundamental concepts of physical science. The work will be as broad as is consistent with the time and needs of the students.

This department is equipped with vernier and micrometer calipers, micrometer microscopes, comparator, dividing engine, cathetometer, simple and compound pendulums, and balances for exact measurements in mechanics. It has also apparatus for determining the coefficient of linear expansion and for the determination of specific and latent heats, a weight thermometer apparatus for determining the density of liquids and solids, a thermo-couple for direct determination of temperatures up to 1650° C., Melloni's apparatus for investigation in radiant heat, and apparatus for determining the mechanical equivalent of heat.

In light, the laboratory is equipped to carry on the usual college work. The department has apparatus for finding the focal length of lenses and mirrors: a Pulfrich refractometer; spectrometers; an interferometer (Institute of Technology patterns); photometer; total reflectometer; and many smaller instruments, including simple and compound microscopes. The greater part of the above listed apparatus is new, having been recently purchased of foreign makers.

The laboratory for exact measurements in electricity and magnetism is also fitted up with new apparatus recently purchased of the Leeds and Northrup Company of Philadelphia, and among other instruments are several types of D'Arsonval galvanometers; Wheatstone bridges, slide wire and post-office patterns; standard cells (Clark and Weston types); standards of resistance, capacity, and self-induction; magnetometers; voltameters; and many smaller instruments sufficient to carry on the usual college work in electrical measurements. For advanced electrical measurements the department is provided with Weston and Thompson ammeters, and voltmeters with both low and high ranges, wattmeters, a Leeds and Northrup alternating and direct current comparator.

In the subject of sound the department is provided with apparatus for the determination of wave-length, pitch, frequency, etc.

## Subjects.

I. Descriptive Physics.—A course designed for students in Agriculture. Considerable time is given to the discussion of the principles of mechanics as applied to farm machinery. The course furnishes an excellent foundation for further work in agricultural physics. *Five recitation credits per week, second term. Required of Sophomores in Agriculture and Home Economics.* Mr. Cloke.

II. General Physics.—A mathematical treatment of the subject. *Four recitation credits per week, throughout the year. Required of all Sophomores in Engineering and Teachers' Course in Applied Science.* Professor Dickinson.

III. Laboratory Physics.—A course in physical measurements intended to teach students methods and to form a basis for future engineering work. The calculation of results will be given special attention. *One and one-half laboratory credits per week, throughout the year. Required of Sophomores in Engineering and Teachers' Course in Applied Science.* Mr. Cloke.

IV. Electrical Measurements.—A course of lectures treating of the theory and manipulation of electrical measuring instruments. *One recitation credit per week, first term. Required of Juniors in Electrical Engineering.* Professor Dickinson.

V. Electrical Measurements Laboratory.—Direct-currents measurements, resistance, potential current, magnetic properties of iron and steel, calibration of direct-current instruments. *One and one-half laboratory credits per week, first term. Required of Juniors in Electrical Engineering.* Professor Dickinson.

VI. Principles of Illumination.—A study of different sources of light, the measurement of candle power, and the principles of illuminating engineering. *One recitation credit and one and one-half laboratory credits per week, first term. Required of Juniors in Electrical Engineering.* Professor Dickinson.

A. Elementary Physics.—A course designed to give the student a grasp of the more important physical principles underlying Engineering work. *Three recitation credits per week, throughout the year. Required of Short-Course students in Engineering, second year.* Mr. Cloke.

## Woodwork.

MR. T. C. RODMAN.

H. Farm Buildings.—A practical course in the planning of farm structures, estimating quantities of material required, and costs. *One shop credit per week, second term. Required of Short-Course students in Agriculture, second year.*

I. Shopwork.—Woodworking at the bench and lathe. *One and one-half shop credits per week, first term. Required of Short-Course students in Agriculture, second year.*

## Zoölogy.

PROFESSOR BARLOW.

The work in this department is designed to meet the needs of two classes of students, those who are interested in the economic aspect of animal life and those who purpose to become teachers. To meet the needs of the first class, subjects are given which are planned to call attention to the economic importance of the different orders. Much time is allotted to entomology, and in this subject special attention is given to injurious species. For those who are to be teachers, a thorough training is given in the morphology and classification of animals as a preparation for the more special subjects that follow. In these, attention is directed to the habits and relations of animals, which are studied both in the field and laboratory.

The laboratory is equipped with a series of charts, valuable models, and many mounted skeletons. The Rhode Island birds are represented by mounted speciments of practically every species; fishes, reptiles, and batrachians, by alcoholic preparations. The collection of insects, begun recently, now fills about one hundred cases, and is being steadily increased. Each student is given the use of compound and dissecting microscopes. The necessary instruments for laboratory work can be procured at small cost at the college store.

### Subjects.

I. General Zoölogy.—Discussion of the more important laws of biology and the dissection of representatives of the more important Phyla. *Two laboratory and two recitation credits per week, first term. Required of Sophomores in Agriculture, Home Economics, and Applied Science.*

II. General Zoölogy.—Special attention is given to the relation of animals to their surroundings. *Two laboratory credits and one recitation credit per week, second term. Option for Seniors in Applied Science.*

III. Physiology.—The physiology of the higher mammals. *One laboratory and three recitation credits per week, second term. Required of Sophomores in Agriculture, Home Economics, and Applied Science.*

IV. Economic Entomology. — *One laboratory and three recitation credits per week, second term. Required of Juniors in Agriculture. Option in Applied Science.*

V. General Entomology.—*Two laboratory credits and one recitation credit per week, first term; two recitation and three laboratory credits per week, second term. Option for Seniors in Applied Science.*

VI. Systematic Entomology.—*Three or five laboratory credits per week, throughout the year. Elective for those who are taking or have taken Zoölogy V.*

VII. Vertebrate Anatomy.—*Two laboratory credits and one recitation credit per week, first term. Required of Juniors in Home Economics. Option for Juniors in Applied Science.*

VIII. Histology and Embryology.—*Three laboratory and two recitation credits per week, second term. Required of Juniors in Home Economics. Option for Juniors in Applied Science.*

IX. Methods in Nature Study.—Bird life, habits of insects, aquaria. *One and one-half laboratory or field credits per week, second term. Elective.*

A. Elementary Zoölogy.—Deals with forms of economic importance. *Three recitation and one and one-half laboratory credits per week, first term. Required of Short-Course students in Agriculture and Domestic Science, first year.*

# Organizations.

## Athletic Association.

| | |
|---|---|
| James F. Nugent | President. |
| William Henry Tully | Vice-President. |
| John Barlow | Secretary-Treasurer. |

## Agricultural Club.

| | |
|---|---|
| Howard Albert Safford | President. |
| Patrick Joseph Healy | Vice-President. |
| Jonathan Farnum Comstock | Secretary. |
| Walter Colwell Irons | Treasurer. |

## Debating Club.

| | |
|---|---|
| William Thomas Neal | President. |
| Carle M. Bigelow | Vice-President. |
| Patrick J. Healy | Secretary-Treasurer. |

## Engineering Society.

| | |
|---|---|
| Charles E. Angilly | President. |
| James F. Nugent | Vice-President. |
| Chester B. Hadley | Secretary-Treasurer. |

## Literary Society.

| | |
|---|---|
| Harold W. Browning | President. |
| Cedric H. Collins | Vice-President. |
| Earl Clifton Webster | Secretary. |
| Alexander D. MacLellan | Treasurer. |

## Science Club.

| | |
|---|---|
| Royal Linfield Wales, B. S. | President. |
| John Barlow, A. M. | Vice-President. |
| Robert A. Lichtenthaeler | Secretary. |

## Student Council.

| | |
|---|---|
| Charles E. Angilly | President. |
| Philip H. Clark | Vice-President. |
| Ralph I. Alexander | Secretary-Treasurer. |

## Young Men's Christian Association.

| | |
|---|---|
| Harry Benjamin Albro | President. |
| Charles H. Larkin | Vice-President. |
| Rudolf W. Ruprecht | Secretary. |
| Walter C. Irons | Treasurer. |

## Young Women's Christian Union.

| | |
|---|---|
| Annie Eliza Kenyon | President. |
| Dorothy Bullock | Vice-President. |
| Sara Iola Wilson | Secretary. |
| Marion Borden | Treasurer. |

## Dramatic Club.

| | |
|---|---|
| Rudolf W. Ruprecht | President. |
| Sara Iola Wilson | Vice-President. |
| Earl A. Tyler | Secretary-Treasurer. |

## Rifle Club.

| | |
|---|---|
| Burton K. Harris | President. |
| David E. Warner | Captain. |
| Patrick J. Healy | Secretary. |
| James F. Nugent | Treasurer. |

## Lecture Association.

| | |
|---|---|
| R. W. Ruprecht | President. |
| Allae C. Slater | Vice-President. |
| L. P. Dickinson, B. S. | Treasurer. |
| Philip H. Clark | Assistant Treasurer. |

# Alumni Association.

Chapin Trafford Arnold, 1894............................President.
Providence, R. I.

Edith Cecelia Keefer, 1903............................Vice-President.
New York.

John Raleigh Eldred, 1900........................Secretary-Treasurer.
Kingston, R. I.

*Executive Committee.*

C. T. Arnold, 1894
John R. Eldred, 1900.
Edith C. Keefer, 1903,
Leroy L. Mounce, 1910.
H. R. Tisdale, 1909.

# Students.

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## Graduates.

Amison, Elizabeth Ellen (B. S., Simmons College, '09) Bacteriology..Kingston.
Cobb, George Robert (B. S., Mass. Agr. College '08) Horticulture and Zoölogy..........Kingston.
Hammett, Frederick Simons (B. S., Tufts College '08) Chemistry and Botany..........Kingston.

## Seniors.

Andrews, Carmen Nichols, Appl. Sci..........Slocum.
Angilly, Charles Enoch, Jr., Civ. Eng..........Providence.
Caldwell, Dorothy Walcott, Civ. Eng..........Woonsocket.
Easterbrooks, Harold Arnold, Appl. Sci..........Providence.
Easterbrooks, Louis Church, Agr..........Providence.
Edwards, Clarence Bland, Agr..........Kingston.
Gilchrest, Clyde Ronald, Elec. Eng..........Leominster, Mass.
Harris, Burton Kenneth, Chem. Eng..........Lime Rock.
Healy, Patrick Joseph, Agr..........Newport.
Kent, Robert Willard, Mech. Eng..........Woonsocket.
Kenyon, Annie Eliza, Appl. Sci..........Usquepaug.
Minor, Arthur Jacob, Civ. Eng..........Kingston.
Neal, William Thomas, Agr..........Pittsfield, Mass.
Robinson, Benjamin Rowland, Mech. Eng..........Bedford Station, N. Y.
Ruprecht, Rudolf William, Appl. Sci..........New York, N. Y.
Safford, Howard Albert, Agr..........Providence.
Tucker, Harriet Taber, Appl. Sci..........West Kingston.
Wade, Ceylon Raymond, Civ. Eng..........Bridgeton.
Warner, David Edmond, Jr., Agr..........Bridgeton.

## Juniors.

Albro, Harry Benjamin, Elec. Eng..........Pontiac.
Barlow, Henry Newell, Elec. Eng..........Wassaic, N. Y.
Bigelow, Carle Muzzy, Appl. Sci..........Woonsocket.
Briden, Frank Harold, Mech. Eng..........Central Falls.
Clark, Philip Harrison, Elec. Eng..........Centreville.
Cobb, Electra Henrietta, Home Econ..........Howardville, Va.
Comber, Edward Anthony, Elec. Eng..........Narragansett Pier.

| | |
|---|---|
| Davis, Edgar George, Civ. Eng. | Providence. |
| Doll, Walter, Mech. Eng. | Pawtucket. |
| Henderson, Ethel Pierce, Appl. Sci | Westerly. |
| Johnson, Charles Varnum, Civ. Eng. | Allenton. |
| Larkin, Charles Herbert, Civ. Eng. | Ashaway. |
| Nutting, Bertha May, Home Econ. | Brickerville, Pa. |
| Patterson, Arthur John, Elec. Eng. | Buffalo, N. Y. |
| Richmond, Fred Allen, Elec. Eng. | Hope Valley. |
| Sherman, George William, Jr., Elec. Eng. | Lafayette. |
| Slater, Allae Cordelia, Home Econ. | Slocums. |
| Steck, Frank, Chem. Eng. | Newark, N. J. |
| Sullivan, John Leo, Elec. Eng. | Lonsdale. |
| Webster, Samuel C., Jr., Agr. | Westerly. |

## Sophomores.

| | |
|---|---|
| Ahrens, Bernard Alexander, Agr. | Elmhurst, Long Island, N. Y. |
| Alexander, Ralph Irwin, Mech. Eng. | Baldwinville, Mass. |
| Baldwin, George Holland, Elec. Eng. | Valley Falls. |
| Bates, Reuben Charles, Civ. Eng. | Longmeadow. |
| Borden, Marion Wilhelmina, Home Econ. | Providence. |
| Brooks, John Charles, Elec. Eng. | Ashton. |
| Champlin, Charles Edwin, Elec. Eng. | Westerly. |
| Cohen, Benjamin, Elec. Eng. | New Bedford, Mass. |
| Comstock, Jonathan Farnum, Agr. | Cranston. |
| Congdon, Esther Loomis, Home Econ. | Wakefield. |
| Corr, William John, Chem. Eng. | East Greenwich. |
| Elkins, Dorothy Dearborn, Home Econ | Amesbury, Mass. |
| Elkins, Marguerite White, Home Econ. | Amesbury, Mass. |
| Ford, Alice Edith, Agr. | North Easton, Mass. |
| Freeman, Philip Edwards, Eng. | Stony Creek, Va. |
| Goodchild, Charles Isaac, Mech. Eng | Providence. |
| Hart, Crawford Peckham, Agr. | Newport. |
| Hauxhurst, Harold Williams, Elec. Eng. | Providence. |
| Hopkins, Raymond Canfield, Eng. | Shannock. |
| Howes, James Ellis, Agr. | Dennis, Mass. |
| Irons, Walter Colwell, Agr. | North Scituate. |
| Kelley, Levi Martin, Civ. Eng. | Cranston. |
| Noyes, Edwin Roy, Elec. Eng. | East Greenwich. |
| Porter, William James, Elec. Eng | Valley Falls. |
| Potter, Charles Thornton, Agr. | Natick. |
| Redding, William Francis, Civ. Eng. | Meshanticut. |
| Reiner, Waldo, Civ. Eng. | Brooklyn, N. Y. |
| Reynolds, Arthur Leslie, Elec. Eng. | Providence. |
| Slocum, George Edwin, Elec. Eng. | Providence. |
| Stedman, Oliver Hazard, Mech. Eng. | Peace Dale. |
| Swift, Paul Gammons, Mech. Eng | West Falmouth, Mass. |
| Tully, William Henry, Appl. Sci | Peace Dale. |

| | |
|---|---|
| Turner, Walter Raymond, Appl. Sci | Johnston. |
| Webb, William Henry, Elec. Eng. | Cranston. |
| Wilcox, Erroll Kenyon, Eng | Westerly. |
| Wood, Susie Stanton, Home Econ. | Slocums. |
| Young, James Hannibal, Appl. Sci | Brooklyn, N. Y. |

## Freshmen.

| | |
|---|---|
| Aldred, James Hilton, Mech. Eng | Ashton. |
| Anderson, Edwin, Mech. Eng | Newport. |
| Anderson, William Edward, Agr | Westerly. |
| Arnold, Louis Whitman, Appl. Sci | Westerly. |
| Aspinwall, Frederick Otto, Chem. Eng | Pawtucket. |
| Babcock, Edwin States, Elec. Eng | East Greenwich. |
| Barry, Dennis Francis, Appl. Sci | Warren, Mass. |
| Baxter, Frank Howard, Civ. Eng | Sharon, Mass. |
| Benson, Robert John, Elec. Eng | Brockton, Mass. |
| Black, Theodore Edgar, Agr | Westerly. |
| Boulester, Edward James, Appl. Sci | Providence. |
| Brechin, John, Jr., Eng | Bristol. |
| Brown, Herman Byron, Appl. Sci | Hope Valley. |
| Browning, Harold William, Appl. Sci | Matunuck. |
| Burdick, John Hare Powell, Jr., Eng | Wickford. |
| Carberry, Thomas, Eng | Providence. |
| Casey, John, Mech. Eng | Newport. |
| Clarke, Charles Browning, Civ. Eng | Wakefield. |
| Clarke, Henry Marsh, Civ. Eng | Westerly. |
| Collins, Cedric Hamlin, Civ. Eng | Berkeley. |
| Connor, Thomas Rowley, Elec. Eng | Peace Dale. |
| Davis, Henry Ellis, Agr | Providence. |
| Esty, James Russell, Elec. Eng | Slatersville. |
| Finch, Myron Whitmarsh, Agr | Providence. |
| Ford, Helen Wheeler, Home Econ | North Easton, Mass. |
| Glynn, John Charles, Eng | New London, Conn. |
| Hartwell, Gladys, Home Econ | Kingston. |
| Hawkins, Myron Angell, Agr | Providence. |
| Huling, Frederick Harris, Eng | Central Falls. |
| Huntley, Herbert George, Eng | New London, Conn. |
| Jones, Carlton Walter, Civ. Eng | Providence. |
| Karmann, Herman Harry, Civ. Eng | Providence. |
| Kinney, Lorenzo Foster, Jr., Appl. Sci | Kingston. |
| Knowles, Chester Lewis, Appl. Sci | Point Judith. |
| MacLellan, Alexander Davies, Civ. Eng | Newport. |
| Matthews, Wilfred Chipman, Elec. Eng | Providence. |
| May, Cyril Mercer, Mech. Eng | East Greenwich. |
| Meears, Etta Elizabeth, Home Econ | Kingston. |
| Nathanson, Joseph George, Elec. Eng | Central Falls. |
| Newton, Leroy Burgess, Eng | West Barrington. |

| | |
|---|---|
| Nicholson, Olive, Appl. Sci | Pawtucket. |
| Nicholson, Sarah Alice, Home Econ | Pawtucket. |
| Oslin, William Henry, Chem. Eng | Providence. |
| Pember, Howard Stephen, Eng | Westerly. |
| Pollard, Raymond George, Mech. Eng | Valley Falls. |
| Price, Milton Harris, Agr | Providence. |
| Reiner, Frieda, Home Econ | Brooklyn, N. Y. |
| Reiner, Herbert, Agr | Brooklyn, N. Y. |
| Rollins, John Frank, Mech. Eng | New London, Conn. |
| Rossi, Louis, Civ. Eng | Westerly. |
| Safford, Edith Marie, Home Econ | Lancaster, Mass. |
| Shea, Joseph Francis, Elec. Eng | Valley Falls. |
| Sherwin, LeRoy Merton, Mech. Eng | Pittsfield, Mass. |
| Spargo, Thomas John, Appl. Sci | Westerly. |
| Thayer, Harold Francis, Appl. Sci | Woonsocket. |
| Thornley, Albert Lewis, Appl. Sci | Pawtucket. |
| Tucker, Myron Griffin, Eng | Wakefield. |
| Turner, Harvey Robert, Civ. Eng | Providence. |
| Watson, Adelaide Gilbert, Home Econ | Peace Dale. |
| Webster, Earl Clifton, Eng | Providence. |
| Whittaker, LeRoy Allen, Elec. Eng | Central Falls. |
| Winslow, Lorrimer Alton, Elec. Eng | Valley Falls. |
| Young, Edwin Olney, Elec. Eng | East Greenwich. |

### Irregular in Classification.

| | |
|---|---|
| Bullock, Dorothy Jennette, Home Econ | Pawtucket. |
| Croucher, Elizabeth, Home Econ | Newport. |
| Diaz, George Soler, Elec. Eng | Havana, Cuba. |
| Gillette, Mary Adelaide, Home Econ | Providence. |
| Gillette, Sarah Elizabeth, Home Econ | Providence. |
| Goddard, Archie Coggeshall, Agr | Newport. |
| Hadley, Chester Brown, Mech. Eng | Woonsocket. |
| Henderson, Samuel James, Eng | Hingham Centre, Mass. |
| Kimball, Rhoda Evelyn, Agr | South Dartmouth, Mass. |
| Mason, Howard, Eng | Pawtucket. |
| Matteson, Wayne Thurman, Civ. Eng | Block Island. |
| Mounce, Harry Lyden, Agr | North Marshfield, Mass. |
| Nugent, James Francis, Eng | Providence. |
| Phillips, Fred Sheldon | Lafayette. |
| Pritchard, David, Agr | Auburn. |
| Robinson, Eben George, Agr | Edgewood. |
| Slavin, Matthias, Mech. Eng | New Bedford, Mass. |
| Tyler, Earl Albert, Appl. Sci | Centreville. |
| Whalen, William Joseph, Appl. Sci | Providence. |
| White, Fred Pierce, Chem | Pawtucket. |

## Two-Year Courses.

| | |
|---|---|
| Blackler, Edwin Alston, Mech. Arts | Westerly. |
| Brindle, Robert, Jr., Mech. Arts | Woonsocket. |
| Caldwell, Frederick Wyllys, Mech. Arts | Woonsocket. |
| Clapp, Harry Edwin, Mech. Arts | Westerly. |
| Dolloff, Vincent Arthur, Agr. | Providence. |
| Girard, Alphonse Herbert, Mech. Arts | Woonsocket. |
| Halliday, Robert Crossley, Agr. | Pawtucket. |
| Harding, Ada LaPlace, Dom. Sci | Lyme, Conn. |
| Harris, Meyer Isidor, Agr | New York, N. Y. |
| Herreshoff, Lewis Francis, Agr. | Bristol. |
| Hoxsie, Harry Bailey, Agr | Quonochontaug. |
| Kyle, Thomas, Agr | Central Falls. |
| Lambert, Leroy Leigh, Agr. | Apponaug. |
| O'Keefe, John Andrew, Jr., Mech. Arts | Providence. |
| Quintero, Carlos, Agr | Panama, Panama. |
| Smith, Henry James, Agr | Ansonia, Conn. |
| Stowell, Leo Merrill, Agr | Hatfield, Mass. |
| Tefft, Helen Macy, Dom. Sci. | Jamestown. |
| Tefft, Lucy Catherine, Agr | Jamestown. |
| Webb, George Henry, Agr. | Pawtucket. |
| Wilson, Sara Iola, Dom. Sci | Westerly. |

## Poultry-Keeping.

| | |
|---|---|
| Allen, H. F. | Northboro, Mass. |
| Allen, Howard W | Providence. |
| Allen, Ruth Linda | Providence. |
| Anderson, David | Melrose Highlands, Mass. |
| Anderson, William A. | Melrose Highlands, Mass. |
| Anderson, William | Newport. |
| Auerbach, Meyer | New York City. |
| Goodchild, William C. | Providence. |
| Gross, Andre. | Saylesville. |
| Hastings, Charles Byron | Providence. |
| Heaton, George B | South Boston, Mass. |
| Hemenway, Rodney F. | Lowell, Mass. |
| Hiestand, William H | Pottstown, Pa. |
| Leuba, Fernand Henri | Coventry. |
| Lyford, Sylvanus Cook | Claremont, H. N. |
| MacMurtry, Friend A. | Littleton, Mass. |
| Magill, William I | Hoboken, N. J. |
| Manchester, Philip | Middlebury, Vt. |
| Monks, Esther Annie | South Milford, Mass. |
| Mugan, Dennis A | Providence. |
| Murray, H. M. | Newnan, Georgia. |
| Paine, Marcia Woodworth | Barnstable, Mass. |

| | |
|---|---|
| Pelletier, Walter Albert | Marlboro, N. H. |
| Peters, George Albert | New Bedford, Mass. |
| Storms, Charles C | Providence. |
| Sugiyama, Tauzabro | Brooklyn, N. Y. |
| Trafton, Mary Adelaide | Fall River, Mass. |
| Youshie, Tey | New York, N. Y. |

## Summer School.

| | |
|---|---|
| Allen, Eliza | Peace Dale. |
| Arnold, Marion W | West Greenwich Center. |
| Austin, John H | Westerly. |
| Austin, Jennie | Westerly. |
| Brown, Amey | Auburn. |
| Cawley, Katherine L | East Providence. |
| Cawley, Anna G | East Providence. |
| Clark, Gertrude M | Providence. |
| Collins, Reba J | West Kingston. |
| Coyne, Grace M | Providence. |
| Crocker, Hannah M | Providence. |
| Crocker Nellie F | Providence. |
| Dawley, Jennie A | Westerly. |
| Dubois, A. Alice C | Edgewood. |
| Dubois, Gladys H. Church | Edgewood. |
| Ford, James | Cambridge, Mass. |
| French, Isabel C | Wakefield. |
| French, Mahala W | Pawtucket. |
| Groff, Susanna S | Peace Dale. |
| Hawkins, Marguerite | Hope Valley. |
| Hurley, Katherine M | Providence. |
| Hurley, Lila | Providence. |
| Lyons, Mary | Peace Dale. |
| MacMahon, Susie | Westerly. |
| Martin, Mrs. E. J | Westerly. |
| Martin, Lizzie E | Westerly. |
| Murphy, Edward T | Newport. |
| Northrup, May M | Wickford. |
| Noyes, Edwin A | East Greenwich. |
| Palmer, Ruth C | West Kingston. |
| Robinson, Anna D | Wakefield. |
| Salisbury, LeRoy A | Hope. |
| Sherman, Ruth E | Peace Dale. |
| Steere, Deborah W | Mapleville. |
| Tucker, Ellen Capron | Kingston. |
| Tucker, Ethel Aldrich | Kingston. |
| Whaley, Clara P | Wakefield. |
| Waters, Susan R | Providence. |
| Wilber, Sarah M | West Kingston. |

| | |
|---|---|
| Graduate students | 3 |
| Seniors | 19 |
| Juniors | 20 |
| Sophomores | 37 |
| Freshmen | 63 |
| Irregulars | 20 |
| Two-Year Courses | 21 |
| Poultry Students | 28 |
| Summer School | 39 |
| Total number of students (none counted twice) | 250 |

# Graduates.*

## 1894.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Adams, George Edward<br>Kingston. | Agr. | Chief of Dept. of Agriculture and Professor of Agronomy, R.I.S.C. |
| Ammonds, George Clarence<br>5 Boylston Place, Boston, Mass. | Mech. | Railroad Postal Clerk, on N. Y., N. H. & H. R. R. |
| Arnold, Chapin Trafford<br>61 Thurston St., Providence. | Agr. | Electrical Contractor, Office 26 Custom House St., Providence. |
| Burlingame, Geo. Washington<br>R. F. D. No. 2, Box 56, North Scituate. | Agr. | Farmer. |
| Clark, Helen May (Mrs. Wm. F. B. Leavitt), B. L., Smith College 1899. Essex Fells, New Jersey. | | At home. |
| Knowles, John Franklin<br>Kingston. | Mech. | With Contractor John Bristow. |
| †Madison, Warren Brown | Agri. | |
| Mathewson, Ernest Hoxsie<br>Ph. B., Brown Universtiy, 1896.<br>1486 Meridian Place, Washington, D. C. | Mech. | Crop Technologist in Tobacco, U. S. Department of Agriculture. |
| Peckham, Reuben Wallace<br>Melville Station, Newport | Agr. | Market Gardener. |
| Rathbun, William Sherman<br>Northampton, Mass. | Agr. | With Printing Department, Eureka Ruling and Binding Co., Holyoke, Mass. |
| Rodman, George Albert<br>New Haven, Conn. | Mech. | Building Dept., Room 24, General Office Bldg., N. Y., N. H. & H. R. R. Co. |
| Sargent, Charles Lawrence<br>Ph. D., University of Pennsylvania, 1900.<br>9 Thomas St.,<br>Newark, New Jersey. | Agr. | Chemist, Murphy Varnish Co. |
| Slocum, Samuel Watson<br>130 West Broad St., Westerly. | Agr. | Carpenter. |
| Spears, John Barden<br>Foster Centre. | Agr. | Farmer. |

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* It is earnestly desired that graduates inform the college office of any permanent change of address.

† Deceased.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| SWEET, STEPHEN ADELBERT<br>Slocums. | Agr. | Farmer. |
| TUCKER, GEORGE MASON<br>Ph. D., Göttingen, 1899. | Agr. | In charge of agricultural work on estate, Bluefields, Nicaragua. |
| WILBER, ROBERT ARTHUR<br>East Greenwich. | Mech. | Express Agent. |

## 1895.

| | | |
|---|---|---|
| ALBRO, LESTER FRANKLIN<br>Melville Station, Newport. | Agr. | Professional Singer. |
| BURDICK, HOWLAND<br>Kingston. | Agr. | Instructor in Dairying, R. I. S. C. |
| CLARKE, CHARLES SHERMAN<br>Jamestown. | Mech. | Marine Engineer. |
| ELDRED, MABEL DEWITT<br>Kingston. | | Instructor in Drawing, R. I. S. C. |
| HAMMOND, JOHN EDWARD<br>Jamestown. | Agr. | Farmer. |
| OATLEY, LINCOLN NATHAN<br>Wakefield. | Mech. | Contractor and Builder; Coal Dealer. |
| SCOTT, ARTHUR CURTIS<br>Ph. D., Univ. of Wisconsin, 1902.<br>Austin, Texas. | Mech. | Professor of Electrical Engineering, Consulting Engineer, Univ. of Texas. |
| TEFFT, JESSE COTTRELL<br>Jamestown. | Mech. | Purser, Newport and Jamestown Ferryboat Co. |
| WINSOR, BYRON EDGAR<br>Coventry. | Mech. | Poultryman. |

## 1896.

| | | |
|---|---|---|
| BROWN, MAY (MRS. CHARLES A. WHITE).<br>Narragansett Pier. | | At home. |
| GREENMAN, ADELAIDE MARIA<br>(MRS. R. WALLACE PECKHAM)<br>Melville Station, Newport. | | At home. |
| KENYON, ALBERT LEWIS<br>35 Chestnut St.,<br>South Manchester, Conn. | Mech. | Farmer. |
| MOORE, NATHAN LEWIS CASS<br>Venice, Florida. | Agr. | Fruit-Grower, citron culture. |
| TABOR, EDGAR FRANCIS<br>69 Doyle Ave., Providence. | Mech. | Calico Printer, U. S. Finishing Co., Silver Spring Branch. |
| *WILLIAMS, JAMES EMERSON | Agr. | |

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*Deceased.

## 1897.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Carmichael, Welcome Sands<br>Shannock. | Sci. | Bookkeeper, Providence Journal Co., Providence. |
| Case, Herbert Edwards Brown<br>Ph. B., Brown University, 1900.<br>Graduate, Hartford Theological Seminary, 1904. | Mech. | Assistant Secretary, Foreign Department, Amer. Board of Commissioners for Foreign Missions, 14 Beacon St., Boston, Mass. |
| Grinnell, Archie Franklin<br>Southbridge, Mass. | Mech. | Head Designer, American Optical Co. |
| Hanson, Gertrude Maie<br>Kingston. | Sci. | Teacher. |
| Hoxsie, Bessie Bailey<br>(Mrs. E. F. Rueckert)<br>98 Melrose St., Providence. | Sci. | At home. |
| Kenyon, Albert Prentice<br>10 West St., Westerly. | Mech. | Bookkeeper, Maxson & Co., Westerly. |
| Kenyon, Charles Franklin<br>Shannock. | Mech. | Stationary Engineer, Boston, Mass. |
| Larkin, Jessie Louise<br>98 Beach St., Westerly. | Sci. | Genealogist. |
| Marsland, Louis Herbert,<br>Provemont, Michigan. | Mech. | Farmer and Fruit Grower. |
| Tefft, Eliza Alice<br>1 Stanton St., Westerly. | Sci. | Teacher, East Greenwich. |
| Thomas, Irving<br>2633 West Sterner St., Philadelphia, Pa. | Mech. | Designer of Patterns. |

## 1898.

| | | |
|---|---|---|
| Arnold, Sarah Estelle<br>(Mrs. R. O. Brooks)<br>975 East 18th St., Brooklyn, N. Y. | Sci. | At home. |
| Barber, George Washington<br>Lakewood. | Agr. | Agent, Metropolitan Life Insurance Co. |
| Cargill, Edna Maria<br>(Mrs. Lester H. Brown)<br>4 Highland Ave., Lonsdale. | Sci. | At home. |
| Case, John Peter<br>26 Cortland St., New York City. | Agr. | With Brown Hoisting Machinery Company. |
| Clark, William Case<br>Wakefield. | Sci. | Secretary and Gen. Mgr. Sea-View Railroad Co. and Narragansett Pier Elec. Light and Power Co.; Mgr. Wickford Light and Water Co. |

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| CONGDON, HENRY AUGUSTUS . .<br>Kingston. | Mech. | Farmer. |
| FLAGG, MARTHA REBECCA . . .<br>Hardwick, Mass | Sci. | At home. |
| HARLEY, WILLIAM FERGUSON . .<br>62 Hillside Ave., Providence. | Agr. | Salesman, with Messrs. Callender, McAuslan & Troup, Providence. |
| TURNER, HARRIETTE FLORENCE<br>(MRS. GEO. M. TUCKER) . . .<br>Graduate, Drexel Institute, 1900. | Sci. | At home, Bluefields, Nicaragua. |
| WILSON, GRACE ELLEN<br>(MRS. W. F. HARLEY) . . .<br>62 Hillside Ave., Providence. | Sci. | At home. |

## 1899.

| | | |
|---|---|---|
| BOSWORTH, ALFRED WILLSON . .<br>Geneva, N. Y. | Sci. | Associate Chemist, N. Y. Agr. Exp. Sta. |
| BROOKS, RALPH ORDWAY . . .<br>975 East 18th St., Brooklyn, N. Y. | Sci. | Consulting Chemist, Bacteriologist, Microscopist, Food-Inspection Expert, 191 Franklin St., New York City. |
| GEORGE, LILLIAN MABELLE . . .<br>A. B. Univ. Ill., 1904.<br>Graduate, N. Y. State Library School, 1910.<br>1104 L. St., N. W. Washington, D. C. | Sci. | Scientific Assistant, Library of U. S. Dept. of Agriculture. |
| HARVEY, MILDRED WAYNE . . .<br>33 Wall St., New York City | Sci. | Private Secretary, Mechanics and Metals National Bank. |
| KENYON, BLYDON ELLERY . . .<br>Austin, Texas. | Agr. | Instructor, School of Electrical Engineering, Univ. of Texas. |
| KNOWLES, CARROLL . . . . .<br>127 Hamilton St., Providence.. | Mech. | Tool Designer, Brown & Sharpe Mfg. Co. |
| KNOWLES, HARRY . . . . . .<br>Ph. B., Brown University, 1906.<br>1182 Broad St., Newark, N. J. | Sci. | Reporter, Newark Sunday Call. |
| LADD, MERRILL AUGUSTUS . . .<br>Empire Building, Atlanta, Ga. | Mech. | Sales Agent, Supply Dept., General Electric Co. |
| MORRISON, CLIFFORD BREWSTER .<br>543 Broad St., Providence. | Sci. | Chemist. |
| OWEN, WILLIAM FRAZIER . . .<br>Schenectady, N. Y. | Mech. | Engineering Dept., General Electric Co. |
| PAYNE, EBENEZER . . . . .<br>M. D., Univ. Michigan, 1904.<br>Glendora, California. | Sci. | Orange Grower. |

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| PHILLIPS, WALTER CLARKE . . .<br>Ph. B., Brown University, 1902.<br>A. M., Brown University, 1903.<br>1104 W. Illinois St., Urbana, Ill. | Mech. | Instructor in English Literature, University of Illinois. |
| REYNOLDS, ROBERT SPINK . . .<br>Room 314, Gen. Office Bldg.,<br>New Haven, Conn. | Mech. | Assistant Engineer, Bridge Dept., N. Y., N. H. & H. R. R. Co. |
| RICE, MINNIE ELIZABETH<br>(MRS. ROBERT J. SHERMAN) . .<br>Exeter Hill. | Sci. | At home. |
| SHERMAN, ABBIE GERTRUDE<br>(MRS. BENJAMIN BARTON) . .<br>56 Pavilion Ave., Providence. | Sci. | At home. |
| *SHERMAN, GEORGE ALBERT . . | Mech. | |
| THOMPSON, SALLY RODMAN<br>(MRS. LEWIS BALCH, JR.) . .<br>Wakefield. | Sci. | At home. |

## 1900.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| BRIGHTMAN, HENRY MAXSON . .<br>50 Church St., New York City. | Mech. | Heating and Ventilating Engineer with B. F. Sturtevant Co. |
| CROSS, CHARLES CLARK . . . .<br>Detroit, Mich. | Mech. | Supt. of Inspection, Chalmers Motor Co. |
| ELDRED, JOHN RALEIGH . . .<br>Kingston. | Mech. | Instructor in Mechanical Engineering, R. I. S. C. |
| FISON, GERTRUDE SARAH<br>(MRS. JOHN W. ROOT) . . . . .<br>1097 Prospect Place, Brooklyn, N.Y. | Sci. | At home. |
| FRY, JOHN JOSEPH . . . . . .<br>A. B., Oberlin, 1904.<br>Coscob. Conn. | Mech. | Prnicipal, Coscob School. |
| GODDARD, EDITH.<br>(MRS. LAWRENCE B. REED) . .<br>10 North St., Plymouth, Mass. | Sci. | At home. |
| KENYON, AMOS LANGWORTHY . .<br>Wood River Junction. | Agr. | Dairyman. |
| MUNRO, ARTHUR EARLE . . . .<br>Ph. B., Brown University, 1902.<br>41 George St., Providence. | Sci. | Attorney-at-Law, 49 Westminster St. |
| SOULE, RALPH NELSON . . . .<br>Box 4509, West Park Station,<br>Philadelphia, Pa. | Sci. | |
| STEERE, ANTHONY ENOCH . . .<br>Amsterdam, N. Y. | Mech. | Resident Engineer, charge Residency No. 3, New York State Barge Canal. |

---

*Deceased.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Stillman, Lenora Estelle<br>1229 Gates Ave., Brooklyn, N. Y. | Sci. | Teacher. |
| Tucker, Bertha Douglass<br>R. F. D. No. 2, Box 105,<br>Swansea, Mass. | Sci. | Dressmaker. |
| Wheeler, Charles Noyes<br>97 Garden St., Pawtucket. | Sci. | Clerk, Wm. H. Haskell Manufacturing Co. |
| Wilson, Joseph Robert<br>Allenton. | Mech. | Surveyor, Alberta, Canada. |

## 1901.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Brayton, Charles Andrew<br>Hope, R. F. D. | Agr. | Farmer. |
| Briggs, Nellie Albertine<br>Providence. | Sci. | Stenographer, R. I. Hospital Trust Co. |
| Burgess, Charles Stuart<br>264 Sayles St., Providence. | Mech. | Draughtsman, Brown & Sharpe Mfg. Co. |
| Clarner, Louis George Karl, Jr.<br>Arnold's Mills. | Sci. | Farmer. |
| Dawley, Edna Ethel<br>Kenyon. | Sci. | Traveling for F. E. Compton & Co. |
| Denico, Arthur Albertus<br>40 Park Ave., Bloomfield, N. J. | Sci. | With American Telephone and Telegraph Co., Traffic Dept. |
| *James, Ruth Hortense<br>(Mrs. Herbert E. Rouse) | Sci. | |
| Sherman, Anna Brown<br>49 Roger Williams Ave., Providence | Sci. | Publisher. |
| Sherman, Elizabeth Agnes<br>41 Milk St., Boston, Mass. | Sci. | Stenographer. |
| Smith, Howard Dexter<br>A. M., Brown University, 1904.<br>Ph. D., Tufts College, 1906.<br>14 Holden St., Lowell, Mass. | Sci. | Instructor in Chemistry, Lowell Textile School. |
| Steere, Roena Hoxsie<br>98 Fifield St. Providence. | Sci. | Stenographer, with Anthony & Cowell Co. |
| Wilby, John<br>Flat River, Missouri. | Sci. | Supply Clerk, Central Lead Co. |

## 1902.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Clarke, Latham<br>A. M., Brown University, 1903.<br>Ph. D., Harvard University, 1905.<br>Boylston Hall, Cambridge, Mass. | Chem. | Instructor in Chemistry, Harvard University. |

---

*Deceased.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| FERRY, OLIVER NEEDHAM . . .<br>8 Armington Ave., Providence. | Mech. | In charge of Production Dept., Maxwell-Briscoe Mfg. Co. |
| MAXSON, RALPH NELSON . . .<br>Ph. D., Yale University, 1905.<br>366 Transylvania Park, Lexington, Ky. | Chem. | Professor Inorganic Chemistry, State University. |
| PITKIN, ROBERT WILLIAM . . .<br>Rockville, Conn., R. F. D. No. 1. | Mech. | Farmer. |

## 1903.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| BARBER, KATE GRACE . . .<br>Ph. D., Yale University, 1906.<br>1104 L. St., N. W., Washington, D. C. | Gen. Sci. | Micro-analyst, Bureau of Chemistry, U. S. Department of Agriculture. |
| CONANT WALTER AIKEN . . .<br>Temple, N. H. | Agr. | Dairying, The Conant and Clement Farms, Hillsboro County. |
| GODDARD, WARREN, JR. . . .<br>Graduate, New Church Theological School, 1907.<br>89 Prospect St., Fall River, Mass. | Mech. | Minister, Church of the New Jerusalem. |
| KEEFER, EDITH CECILIA . . .<br>63 West 48th St., N. Y. City. | Biol. | Teacher of Mathematics, Miss Spence's School. |
| KENT, RAYMOND WARREN . .<br>A. M., Harvard University, 1904. Akron, Ohio. | Chem. | Chemist, Diamond Rubber Co. |
| TEFFT, ERNEST ALLEN . . .<br>Broadway, Providence. | El. Eng. | With Amer. Locomotive Works. |

## 1904.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| BALLOU, WILLARD ALGER . .<br>332 Lafayette Ave., Brooklyn, N. Y. | Biol. | Instructor in Mathematics, Pratt Institute. |
| QUINN, MARY LOUISE . . . . .<br>510 South Van Buren Ave., Green Bay, Wis. | Biol. | Teacher of Botany and Physiology, East High School. |
| RODMAN, WALTER SHELDON . .<br>M. S., R. I. C. A. & M. A., 1907.<br>Wertland St., University, Va. . . | El. Eng. | Adjunct Professor of Electrical Engineering, University of Virginia. |

## 1905.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| CHAMPLIN, SARAH ELIZABETH .<br>102 Wesleyan Ave., Providence. | Gen. Sci. | Bookkeeper, Burt Mfg. Co., 226 Eddy St. |

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Dow, Victor Wells<br>Hampton, Va. | High. Eng. | In Office of Superintendent of Trade School, Hampton Institute. |
| Gilman, Jean<br>Hampton, Va. | High. Eng. | Assistant to Director of Trade School, Hampton Institute. |
| Harrall, Nellie Armstrong.<br>Graduate, Sargent School of Physical Education.<br>Wakefield. | Gen. Sci. | Instructor in Physical Training, R. I. S. C. |

## 1906.

| | | |
|---|---|---|
| Arnold, Benjamin Howard<br>32 Vine St., Lynn, Mass. | El. Eng. | Gas Engine Engineering Dept., General Electric Co. |
| Berry, Wallace Noyes<br>Interlachen, Fla. | El. Eng. | |
| Elkins, Marion Graham<br>10 Moody St., Amesbury, Mass. | Gen. Sci. | Student, Yale University, 231 Park St., New Haven, Conn. |
| Harding, Lee LaPlace<br>Lyme, Conn. | High. Eng. | Teacher of Mathematics and Physics, Conn. Literary Institution, Suffield, Conn. |
| Keyes, Frederick George<br>Sc. M., Brown Univ., 1907.<br>Ph. D., Brown Univ. 1909.<br>Boston, Mass. | Chem. | Research Laboratory of Theo. Chemistry, Mass. Institute of Technology. |
| Nichols, Howard Martin<br>601 Collins Ave.,<br>Pittsburg, Pa. | El. Eng. | Commercial Engineer, Electric Renovator Co. |
| Sisson, Cora Edna<br>M. S., Brown Univ., 1910.<br>Wickford. | Gen. Sci. | Teacher. |
| Wilkinson, Albert Edmund.<br>Lyndon Centre, Vermont. | Agr. | Horticulturist, Lyndon Institute. |

## 1907.

| | | |
|---|---|---|
| Barber, Arthur Houghton<br>East Greenwich. | Mech. Eng. | In business. |
| Coggins, Calvin Lester<br>M. S. Dartmouth College, 1910.<br>Hoboken, N. J. | El. Eng. | Instructor in Physics, Stevens Institute of Technology. |
| Ferry, Jay Russell<br>525 West 160th St.,<br>New York City. | High. Eng. | Draughtsman for Post & McCord, 44 East 23d St., New York City. |
| Kellogg, David Raymond<br>1559 Highland St.,<br>Columbus, O. | Chem. | Instructor in Chemistry, Ohio State University. |

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Kendrick, Winfield Smith . .<br>32 Vine St., Lynn, Mass. | El. Eng. | With General Electric Co. |
| Lamond, John Kenyon . .<br>M. A., Yale Univ., 1908.<br>Ph. D., Yale Univ., 1910.<br>5 Stowe Ave., Middletown, Conn. | El. Eng. | Instructor in Mathematics, Wesleyan University. |
| Lewis, Harry Reynolds . .<br>17 Jones Ave.,<br>New Brunswick, N. J. | Agr. | Prof. Dairying and Poultry Husbandry, Rutgers College. |
| Macomber, Miner Sanford .<br>New Brunswick, N. J. | Chem. | Assistant Chemist, New Jersey Agr. Experiment Station. |
| Tucker, Ethel Aldrich . .<br>Fiskeville. | Gen. Sci. | Primary Teacher, Lippitt Hill School, Cranston. |

## 1908.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Drew, Joseph Drake . . .<br>Gary, Indiana. | Chem. | |
| Field, Clesson Herbert . .<br>C. E., Lehigh Univ., 1909.<br>3719 Locust St., Phila., Pa. | Civ. Eng. | With Designing and Estimating Dept., Schuykill Bridge Works. |
| Fiske, Herbert Andrew . .<br>Boone, Iowa. | El. Eng. | Electrical Engineer, Railroad Company. |
| Gardiner, Robert Franklin .<br>1407 Chapin St.,<br>Washington, D. C. | Chem. | Asst. Chemist, Bureau of Soils, U. S. Dept. of Agriculture. |
| Gory, Edward Allen . . .<br>88 Chandler St.,<br>Boston, Mass. | El. Eng. | Electrical Engineer. |
| Kenyon, Susan Elnora<br>(Mrs. Fred K. Crandall) .<br>Westerly. | Biol. | At home. |
| Mitchell, Clovis William .<br>248 Montauk Ave., New London, Conn. | Civ. Eng. | Teacher, Mathematics and Science, Manual Training High School. |
| Rose, Orpha Lillie . . .<br>Peace Dale, R. F. D.. | Gen. Sci. | Teacher, Jackson College, Jackson, Miss. |
| Sheldon, George Ware . .<br>12½ St. James Ave., Boston. | El.Eng. | Student, Mass. Institute of Technology. |
| Sherman, Mary Albro . . . .<br>Lehigh Hill, Portsmouth. | Agr. | On Poultry Plant. |
| Smith, John Lebroc . . .<br>South Bethlehem, Pa. | El. Eng. | Graduate Student, Lehigh University. |
| Whipple, Lucius Albert . .<br>Greenville. | Civ. Eng. | Teacher, Mathematics and Physical Science, The Abbott School, Farmington, Me. |

## 1909.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Cargill, Rhobie Lucelia<br>Abbott Run. | Appl. Sci. | Teacher of Science and Mathematics, High School, 249 Main St., Groveland, Mass. |
| Craig, James McIntyre<br>Laurel Ave., Hollywood, California. | Agr. | Head Gardener on C. E. Norton Estate. |
| Crandall, Fred Kenyon<br>R. F. D. No. 1, Westerly. | Agr. | Farmer. |
| French, Henry Frank<br>42 Barrett St., Lynn, Mass. | El. Eng. | Testman, General Electric Co. |
| Howe, Albert Mendel<br>741 Pleasant St.,<br>Brockton, Mass. | El. Eng. | With Old Colony Street Railway Co. |
| Knowles, Walter<br>127 Hamilton St.,<br>Providence. | Civ. Eng. | Construction Dept., N. Y. N. H. & H. Railroad. |
| Lee, Alfred Rogers<br>Washington, D. C. | Agr. | Junior Animal Husbandman, in Poultry Investigations, Bureau of Animal Industry, U. S. Dept. of Agriculture. |
| Moran, Walter John<br>Willimantic, Conn. | Civ. Eng. | Levelman, N. Y., N. H.,& H. R. R. Co. |
| Moyer, Louis Earl<br>Seneca Falls, N. Y. | Civ. Eng. | Dept. State Engineer, Barge Canal Office. |
| Rockwell, Ruby Belle<br>North Bennington, Vermont. | Chem. | Teacher of Science, High School. |
| Smith, Elmer Francis<br>Essex Fells, New Jersey. | El. Eng. | Instructor in Mathematics and Science, and Athletic Coach, Kingsley School. |
| Tisdale, Harry Robert<br>Box 263, New London,<br>Conn. | Chem. | Student, Mass. Institute of Technology, 20 St. James Ave., Boston. |
| Tucker, Ellen Capron<br>Kingston. | Gen. Sci. | Teacher, West Kingston. |

## 1910.

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Burgess, Paul Steere<br>310 E. Green St.,<br>Champaign, Ill. | Chem. Eng. | Graduate student, University of Illinois. |
| Carpenter, Randolph Haywood<br>Bachelor Hall, Todd St.,<br>Wilkinsburg, Pa. | El. Eng. | In Testing Dept., Westinghouse Electric Mfg. Co., East Pittsburg, Pa. |
| Cummings, Robert Winthrop<br>132 South Common St.,<br>Lynn, Mass. | Mech. Eng. | With General Electric Co. |

| NAME AND ADDRESS. | COURSE. | OCCUPATION. |
|---|---|---|
| Goodale, Ralph Waldo<br>24 College St.,<br>New Haven, Conn. | Civ. Eng. | With N. Y., N. H., & H. R. R. Co. |
| Hardy, John Ira<br>Waterbury, Conn. | Gen. Sci. | Assistant Secretary, Y. M. C. A. |
| Heath, Bertha May<br>Lunenberg, Mass. | Agr. | Student, State Normal School, Fitchburg, Mass. |
| Kenyon, Amos Harris,<br>124 Cedar St.,<br>Pawtucket. | El. Eng. | Asst. Traffic Chief, American Tel. & Tel. Co. |
| Lamond, Helen Scott<br>Usquepaugh. | Gen. Sci. | Teacher, Kenyon. |
| Mounce, Leroy Leidman<br>North Marshfield, Mass. | Agr. | Teacher. |
| Peabody, George Abbott<br>310 Clinton St.,<br>Schenectady, N. Y. | El. Eng. | Electrical Test Engineer, with General Electric Co. |
| Sherman, John Leland<br>Providence. | Agr. | |
| Smith, Hiram Jameson<br>200 Park Ave.,<br>Woonsocket. | Civ. Eng. | In Engineering Dept., Grand Trunk Railway System. |
| Wagner, Albert Frederic<br>21 University St.,<br>Lafayette, Indiana. | El. Eng. | Asst. Instructor in Electrical Measurements, Physics Dept., Purdue University. |
| Wheeler, Richard Howes<br>Box 982,<br>Schenectady, N. Y. | El. Eng. | Electrical Test Engineer, with General Electric Co. |
| Worrall, David Elbridge<br>51 College House,<br>Cambridge, Mass. | Chem. | Graduate Student, Harvard University. |

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